ARCHIVES OF OPHTHALMOLOGY.

ON THE EXTRACTION OF CATARACT ACCORDING TO JACOBSON'S METHOD.

By Dr. E. FRANKE,

ASSISTANT SURGEON TO THE GREIFSWALD OPHTHALMIC HOSPITAL IN CHARGE OF PROF. SCHIRMER.

Translated and slightly abridged by James A. Spalding, M.D., Portland, Me.

GRAEFE'S modified peripheral linear section for the extraction of cataract was more universally and quickly accepted in operative ophthalmology than even its discoverer had believed possible. There was but one method (Jacobson's) which might have successfully disputed with it for preëminence.

It is not our intention to inquire why so slight competition arose between these two methods; but whether it was that Jacobson soon accepted v. Graefe's operation, or that Jacobson's method was hardly even tested by his contemporaries, it appears that Steffan was the only operator who adopted and defended Jacobson's method.

This seems all the more surprising since, on the one hand, in v. Graefe's operation, cyclitis and even secondary sympathetic ophthalmia were repeatedly observed* from the proximity of the incision to the ciliary body, and, on the other, the technical difficulties were by no means slight, for in one step of this operation we had to work in the dark,

* In his paper "On sympathetic affections of the eye after cataract operations," Schneider reports 758 cases of sympathetic ophthalmia, 19 of which were subsequent to v. Graefe's operation. Blessig reports 2 cases in 349 linear extractions. The same has happened after Jacobson's method; 9 cases are mentioned in Schneider's paper. Blessig also saw one case "with a very peripheral section."

while the peripheral and linear section, as demanded, led to various accidents at the hands of those who did not possess v. Graefe's skill. For these very reasons, Jacobson urged the advantages of his own operation.

Linear extractions soon underwent many modifications. One operator abandoned the linear section for a low flap, because the latter favored the exit of the lens; a second added a conjunctival flap; while a third located the section nearer the cornea. Indeed, it is, as v. Wecker lately said, "those who still pretend to operate by v. Graefe's method, use only his knife."

Inasmuch as a genuine v. Graefe method is not employed by most operators, we will agree to understand by this term an upward linear section in the sclera, or even in the sclero-corneal junction, combined with a broad excision of the iris as far as the ciliary processes.

All operators seem to have been timid about placing the section in the sclero-corneal junction and making a flap of a given height, as Jacobson had recommended. But why this was so, we cannot understand. For Steffan had demonstrated that the nucleus of a cataract $3\frac{1}{2}'''$–$4'''$ in diameter, and $1\frac{3}{4}'''$–$2'''$ in height, could not escape through a linear incision $4'''$ in length without extensively bruising the edges of the incision, while the successes of Jacobson and v. Wecker had proved that there was no especial dread of corneal suppuration.* The latter even goes so far as to say: "I remember only too well how suppuration of the cornea, of which I saw nothing while I operated by Jacobson's method, reappeared with all its sad results when I adopted v. Graefe's method."

Perhaps the only reason why Jacobson's operation was less cultivated was the fear of chloroform narcosis, which was deemed indispensable.

* In 477 operations by Jacobson's method, we count only 5 cases of suppuration of the cornea; in 207 by Jacobson himself, 4; in 208 by v. Wecker, none; in 62 by Steffan, 1. In 1875 v. Wecker performed 179 operations on uncomplicated cataracts by his new flap operation with but one suppuration; in 1876, 109 operations, three suppurations, which, however, all appeared in the first four months, while he afterward had 108 operations in succession without any suppuration. In 1872–1875 the same operator had 7 suppurations in 217 operations, 4 in 250, 3 in 179, and 2 in 50. In 97 uncomplicated cataracts, we have had no suppuration of the cornea after Jacobson's operation.

It now seems very significant that v. Wecker, to whom v. Graefe himself testifies that he borrowed his views from facts, should return to the flap in the sclero-corneal junction. And not from the love of novelty, as he himself declares, but because v. Graefe's method did not yield satisfactory results.

The conclusion to which we are forced is that the main point in every extraction is to obtain the largest possible incision, so that the cataract can conveniently escape; but this can only be done by a flap made in the limbus corneæ. Wolfe and others have lately reached similar conclusions, and have good results from a flap in the sclero-corneal junction.

We have employed Jacobson's method since 1870, at least we call it by that name, although it has really lost much of that which Jacobson held to be indispensable. Thus, we do not generally employ chloroform in uncomplicated cataracts, although we do not oppose narcosis. Where the cause lies we cannot say, but in every four cases operated upon in a state of narcosis—it must be very deep—we see only one normal recovery. The operator, whose attention must be wholly concentrated upon so delicate an operation as extraction, cannot continually watch a patient while under narcosis. Then the writhing and retching which ensue during and after the operation, and against which the procedure suggested by Jacobson is of no avail, endanger the eye. If any one had ever met with the accident—luckily not during an extraction—of the sudden and unexpected vomiting of thin fluid over the eye, he will hardly decide in favor of narcosis for an operation which exposes the interior of the eye, and in which such an occurrence would predicate a certain failure. He would abandon narcosis except for cowardly and timid patients.

Only three uncomplicated cataracts were operated upon under narcosis.

The patients are repeatedly atropinized on the day before the operation. I believe that this method, in spite of many opposing arguments, acts as a good prophylactic against subsequent inflammation. That is to say, the action of

atropia reappears after the operation, the iris becomes anæmic, and can thus offer an energetic resistance to all irritating causes, such as fragments of cortex, etc.

The operation is performed at the bed of the patient, whose other eye has been previously bandaged. An assistant holds the lids apart with his fingers, and can thus follow the operator's intentions. The eyeball is fixed with Waldau's forceps, and a Beer's knife entered at the scleral junction; the contrapunction is made exactly opposite in the scleral junction, and the section finished by slowly pushing the knife forward. If the section happens to end with a conjunctival flap, as is desirable, it is divided by Desmarres' blunt knife. If patients are restless and nip their eyelids tightly together, the knife is withdrawn before completing the section, and the remaining corneal bridge, together with a small conjunctival flap, is divided with the blunt knife. If the bridge is broader than usual, the section has less curvature, as the knife then cuts the tissues more perpendicularly. The flap is about as high as that suggested by v. Wecker, who thinks, in making the section with the narrow knife, that he can finish it more quietly and give it a smoother surface. But with Beer's knife we can finish a section just as gently and, on the whole, as smoothly, because with a narrow knife the section has to be finished by several to-and-fro motions.

The section is always made downward, because it facilitates the subsequent steps of the operation, during which the eye of the patient always flies upward; secondly, there is no need of instrumental extraction of the lens; and finally, because we can more easily attend to the after-treatment and cleansing of the wound.

After complete contrapunction the forceps are released, and the iridectomy made without fixation with a common bent iris forceps, the iris being excised by the operator or his assistant. In this step, in opposition to Jacobson, we do not insist upon a total excision of the iris as far as its ciliary portion. On the contrary, we aim to excise the smallest possible portion, particularly of the sphincter, so that in ideal cases the pupil looks like a moderately large

congenital coloboma. We thus avoid excessive dazzling as well as any impediment to the exit of the lens. Nor have we observed any unfavorable secondary results; we have had no more cases of iritis than other observers, while prolapse of iris or adhesion of the iris to the cornea has been very rare.

The capsule is next opened with v. Graefe's cystotome, just as v. Graefe indicated. A slight pressure on the upper lid sufficed to remove the lens. If any visible cortical fragments remain we try to remove them by the well-known rubbing movements, while the incision is made to gape slightly with Daviel's spoon. We never pass the spoon into the eye except when large cortical masses cannot be removed by the method mentioned above.

After the incision the lids and conjunctival sac are well cleansed, and exact coaptation of the edges of the incision obtained, as well as any fragments of iris replaced; both eyes are then bandaged.

The after-treatment is carefully watched, although the chamber is only darkened by curtains. With all due deference to Jacobson's opinion, we do not remove the bandage at so early a date as he suggests. If the case progresses without pain, we do not change the bandages, open the lids, or inspect the cornea, until after four days, the patient meanwhile resting quietly in bed. The eyes are then rebandaged; on the fifth day the operated eye only is bandaged, and the patient can sit up in bed. On the sixth and seventh days the bandage is only worn at night, the patient wearing a green patch in the day, and gradually growing used to the light. If violent pain follows the operation we first resort to the internal or subcutaneous exhibition of morph. hydrochlor., 0.005–0.01; if that has no effect, the bandage is removed, and the eye treated locally according to the symptoms. We have never felt obliged to resort to bleeding after cataract extractions.

The length of treatment varies; in healthy patients living in the city a fortnight is long enough. As most of our patients are working people who must at once resume their daily labor on leaving the hospital, we keep them until they

are capable of work, which, under favorable circumstances, is from three to four weeks.

We have not experimented with antiseptics whose undeniable advantages in surgery are no longer disputed. We have contented ourselves with carefully cleansing the instruments as well as the eyelids of the patient with carbolic acid or alcohol. Our only aim in using antiseptics would be to prevent primary suppurative keratitis or iritis. But to prevent these processes we should have to undertake the impossible task of closing the wound itself antiseptically, which is not done when we cover the closed eyelids with borated lint. All irritant substances which have entered during the operation will propagate themselves unless we can oppose them in the conjunctival sac and the incision. The closed eyelids and a *clean* charpie or wadding bandage are sufficient protection against the entrance of new noxious influences from without. When suppuration has already begun we must resort to suitable local treatment. Finally, antiseptics in extractions are not supported by statistics. In our 97 uncomplicated cases we had no primary suppurative keratitis at all, and Völkers only 1 (0.4 per cent.) in 212; on the other hand, Schiess-Gemuseus had 5 per cent.–6 per cent., and Alfred Græfe, who has gained the most favorable results by antiseptics, had an average of 1¼ per cent.

The patients receive a cataract-glass in about eight weeks after the operation; just before their discharge from the hospital a preliminary test of S is made with glasses.

I will now proceed to a particular description of the 114 cataract operations* performed at this hospital between Oct., 1873, and June, 1880. We have to deduct 6 v. Græfe extractions in complicated cases, in which the narrow knife seemed more suitable, *e.g.*, in traumatic cataract for reopening a previous incision, or in cases in which the globe had become so soft from disease of the vitreous that a good incision could not be made with Beer's knife.

We have therefore 108 extractions by Jacobson's flap

* All the operations were performed at the hospital; even patients who lived in the town were obliged to remain in the hospital during this period.

method with Beer's knife; of these, 97 were uncomplicated cataracts, 11 complicated. The latter should be excluded from accurate statistics of the successes by any given method. As this axiom, however, does not seem to be generally recognized, and as opinions differ so much regarding the idea of complications, I will briefly describe our "complicated" cases.

No. 1. Detachment of the retina in a patient, æt. 24, with phthisis of the R E, and soft cataract L E. The detachment had been previously diagnosticated, and the extraction was only undertaken at the especial request of the patient, as the left eye was the only one that could be saved.

No. 2. Traumatic cataract R E, with perforation of the cornea and iris, and prolapse of iris.

No. 3. Traumatic cataract R E, from a penetrating wound of the cornea, iris, and anterior capsule by a fragment of iron; hypopyon.

No. 4. Lamellar cataract with posterior synechiæ L E. Zonular cataract R E; iridectomy.

Nos. 5 to 8. Cretaceous cataract in No. 8; total corneal staphyloma of the second eye.

No. 9. Senile cataract with dacryocystoblennorrhœa, and intense ozæna on the right side. A successful extraction had been made a year before in the left eye in which these complications did not exist.

No. 10. Soft cataract with chronic uveitis R E. The patient was deaf and dumb. His left eye was totally amaurotic from detachment of the retina, and dislocation of a chalky shrivelled lens. He had recovered a year before from an optic neuritis in the operated eye, and the cataract had developed in this eye at a later date.

No. 11. Shrivelled cretaceous cataract R E, in a boy, æt. 10, with phthisis of the L E.

The operation was normal in seven of these cases. In two of the four abnormal cases prolapse of vitreous occurred (Nos. 2 and 7) in the attempt to extract the lens, which had to be completed with Critchett's spoon.

In case No. 8 the patient nipped his lids forcibly to-

gether after the completion of the section, and caused a prolapse of vitreous, which depressed the lower segment of the iris into the vitreous chamber, as often happens with sudden prolapse of the vitreous after completion of the corneal section. As the lens could not be immediately removed with the spoon, a pair of straight iris forceps was used, and was finally successful, although a considerable portion of the lens was left behind. The case proceeded normally, and the patient was discharged with $S = \frac{1}{3}$. In case No. 10 there was a very slight prolapse of vitreous after the expulsion of the lens.

If we now compare the relations of the course of the operation to recovery, as well as to the consistency of the cataract and the age of the patient, we find that four of the seven normal operations had an abnormal recovery: Nos. 4 and 5 (posterior synechiæ) were followed by plastic iritis, due to the complication, as the rupture of the synechiæ must have caused great irritation of the iris; No. 1 (detachment of the retina) had prolapse of iris with adhesion to the cornea, which may be attributed to the operation; and, finally, a chronic dacryocystoblennorrhœa (No. 9) was followed by complete necrosis of the cornea and total blindness.

Of the four abnormal operations, only one had an abnormal recovery, No. 10, with chronic and posterior synechiæ. The operation was followed by hæmorrhagic iritis with occlusion of the pupil, and resulted in a failure, which was by no means unexpected before the operation, since light and dark could not then be precisely distinguished.

In eleven complicated extractions, therefore, we had but one loss, No. 9, from necrosis of the cornea.

The complicated cataracts were all mature, and, with exception of one senile nuclear cataract, were partly soft and partly shrivelled cataracts in young people. We could not prove that their consistency had any influence upon their recovery, although No. 8, in a girl æt. 28, and No. 11, in a boy æt. 10, showed the favorable influence of youth upon recovery. For in the former case the cretaceous cataract crumbled when being removed with the spoon, so that the

remnants had to be removed bit by bit. This had to be repeated three times; small chalky concretions had to be left behind, but the eye healed perfectly, rapidly, and without a trace of inflammation.

The duration of treatment has already been mentioned, and nothing especial has to be added at this place. No table of visual results is given, as it would not offer a standard for judging the operative method.

The 97 wholly uncomplicated cases were distributed as follows:

AGE.	MEN.	WOMEN.
20–30 years	2	—
31–40 "	3	2
41–50 "	4	4
51–60 "	10	4
61–70 "	20	24
71–80 "	8	15
81–90 "	—	1
	—	—
Total,	47	50

Six men and five women had the operation performed on both eyes. Epileptiform seizures were noticed during the operation in two cases, but had no harmful influence.

In some cases we departed from the regular operation; twice the flap was made upward, as the patients had an upward coloboma in the other eye; twice a supplementary iridectomy was made in cases in which the lens had been extracted easily without an iridectomy, but the iris subsequently prolapsed and had to be abscised. In five cases no iridectomy was done, for the iris enlarged pretty rapidly after the section was finished, the nucleus seemed but moderately large, and the lens was therefore at once successfully extracted. Recovery was normal in three of these cases. In the others the iris and cornea became adherent, without, however, preventing excellent vision.

If we include under the normal operations those in which the regular method was purposely departed from, without resulting in an abnormal operation, we have 73=75 per cent. normal, and 24=25 per cent. abnormal operations.

The abnormities consisted in:

1. *Prolapse of vitreous* in 17 cases =17.5 per cent., which seems high. But we counted even a bead of vitreous as a prolapse. Excessive prolapse was noticed in only 3 cases =3 per cent.—twice immediately after finishing the section, and once during the expulsion of the lens. In the first of these cases the lens was forced from the eye, together with the prolapse of vitreous, in a woman who squeezed her eyelids very forcibly together; in the second the lens was removed with the spoon; the third I will report in detail further on. In the remaining 14 operations, slight prolapse occurred in 7, in the attempt to arrange the lens for extraction, which was then accomplished in every case with the spoon; in 7 other cases a mere bead of vitreous appeared after removal of the lens.

2. *Profuse hæmorrhage from the iris into the anterior chamber after iridectomy* occurred in seven cases, but did no harm except in two cases, one of which is here cited:

The iris in a woman, æt. 65, prolapsed during the section of the cornea and was at once abscised. This caused a profuse hæmorrhage into the anterior chamber, which was increased by the formation of a conjunctival flap. All attempts to remove the blood from the anterior chamber were unsuccessful. As the prolapsed iris had already been abscised, a further iridectomy did not at first seem indicated. The capsule was now split, and a futile attempt made to remove the lens by the usual manœuvres. Owing to the blood in the anterior chamber we could see no reason for the miscarriage. The iris forceps were then introduced, with the expectation of finding a portion of the sphincter standing, but no iris could be seized, and we assumed that the coloboma was complete. Repetition of the pressure produced prolapse of vitreous. The spoon was now introduced, and the lens fished for in the darkness; after several attempts the lens was removed *in toto* from the vitreous chamber, the ciliary body and iris having been repeatedly bruised by the spoon. The recovery was very free from pain, but subacute iritis and cyclitis, with frequent hæmorrhage into the anterior chamber, caused exclusion of the pupil and S $\frac{1}{\infty}$.

After complete absorption of the blood, the sphincter was discovered to be intact, and had consequently hindered the exit of the lens and so caused the prolapse.

We may here assume that atheromatous degeneration of the vessels of the iris caused the profuse hæmorrhage, which has never been observed in young persons. We may add that this was our only case of secondary hæmorrhage into the anterior or vitreous chamber; other observers who operate by v. Graefe's method have noticed it oftener.

3. All remnants of cortex were removed if possible; in three cases only did we leave them behind, because with prolapse of vitreous it seemed better to leave them than to make further attempts at removal. The combination of cortical remnants and prolapse of vitreous caused one case of suppurative hyalitis with total blindness. I cannot cite any cases in which excessive hæmorrhage into the anterior chamber or non-opacified posterior layers of the lens prevented the recognition of remnants left behind.

4. Finally, we may mention a case of iridodialysis with very profuse hæmorrhage, due to the carelessness of the assistant who pulled upon the imperfectly abscised iris with the scissors so that it was wholly torn away from its attachment. The result, however, was not so bad. S $\frac{1}{10}$.

We had a total of 28 abnormities in 24 operations.

Sixty-five of the 73 normal operations (89 per cent.) recovered without any irritation. In 8 (11 per cent.) the following abnormities were observed:

1. Four cases of prolapsed iris, in two of which, already mentioned, no iridectomy was made. (In one, an extraction without iridectomy had been successful years before with a movable pupil.) These recovered with adhesion of the iris and cornea. In the third, recovery ensued after abscising the prolapse; in the fourth, after a compress bandage. Vision was not harmed in any of these cases.

2. One case of slow closure of the wound by slight gaping of the edges of the incision.

3. Two cases of slight iritis without any harm to vision.

4. One case of plastic iritis after normal extraction in an old cow-herd who squeezed his lids together during the operation, and afterward behaved in a very childish and restless manner. This inflammation caused very poor vision which was afterward improved by a secondary operation.

Nineteen (79 per cent.) of the 24 abnormal operations recovered without accident; in 5 (21 per cent.) the following disturbances were noticed:

1. Slow closure of wound from interposition of the vitreous in the case of iridodialysis.

2. Marginal keratitis with iritis and posterior synechiæ in a case of profuse hæmorrhage into the anterior chamber. S $\frac{1}{\infty}$, which may be improved by a secondary operation.

3. One case of plastic iritis and hyalitis with prolapse of vitreous and lens, S $\frac{1}{\infty}$, to be improved by secondary operation.

4. Chronic irido-cyclitis with prolapse of iris, hæmorrhage, and prolapse of vitreous. S $\frac{1}{\infty}$, which may perhaps be improved by a secondary operation.

5. Suppurative hyalitis with prolapse of vitreous and remnants of cortex in the vitreous chamber. The patient was also quite uncontrollable after the operation. The result was phthisis of the globe; S=0.

We are also to notice that primary suppurative keratitis was never observed.

Table II shows the normal and abnormal operations and their relations to recovery.

TABLE II.

		RECOVERY.	
		Normal.	Abnormal.
Normal Operations,	73—75 per cent.	65—89 per cent.	8—11 per cent.
Abnormal "	24—25 "	19—79 "	5—21 "
Total,		84—86 per cent.	13—18 per cent.

We could not decide that the nature of the cataract or the age of the patient had any influence upon the recovery. Only mature or hypermature cataracts were operated upon, and no difference in recovery could be determined.

One woman had delirium tremens during recovery without any unfavorable results.

We have now to apply the test of vision to our opera-

tions, in doing which we meet with several difficulties. It would, undoubtedly, be the best way, if an operator who practises various methods with equal skill and under similar conditions could compare his various results.* But so long as no one can do this with large statistics we shall have to refer to the data of various operators for their successes by the different methods.

The two factors which decide successes are the least number of failures, and the amount of vision recovered.

In my opinion the first-mentioned factor is the more important, for our aim is to restore the patient's vision. As v. Arlt says: "Were I to be operated upon for cataract, I would rely on that method which, on the whole, assures the greatest chances for recovering vision; more or less good vision and all that sort of thing is secondary so far as concerns the choice of a method."

As regards the second factor, it is rarely possible for us to determine the definite amount of vision regained. The visual test at the time of the patient's discharge does not show the final result; in most of the cases vision improves still further at a later date; in a few, it remains as it was; in fewer still, it may diminish.

If I add the three cases of $S=\frac{1}{\infty}$ to the single loss, we have 4 losses in 97 operations=4.01 per cent.

If we now pass to the positive successes, we have the following acuteness of vision:

$1=1$	$\frac{1}{7}=8$	$\frac{1}{40}=1$
$\frac{2}{3}=1$	$\frac{1}{7}=6$	$\frac{1}{50}=2$
$\frac{1}{2}=8$	$\frac{1}{10}=9$	$\frac{1}{60}=1$
$\frac{2}{6}=2$	$\frac{1}{15}=4$	$\frac{1}{200}=1$
$\frac{1}{3}=11$	$\frac{1}{18}=1$	$\frac{1}{\infty}=3$
$\frac{1}{4}=15$	$\frac{1}{20}=5$	$0=1$
$\frac{1}{5}=5$	$\frac{1}{30}=1$	

There were twelve additional cases in which no account of vision, beyond "good" and "very good," was given in

*V. Wecker, Braun, and Blessig are the only operators, so far as I know, who could compare large statistics of the results of Jacobson's and v. Græfe's methods. The former, as we saw, was compelled to abandon the linear section for the sclero-corneal flap. Braun had $6\frac{2}{10}$ per cent. of losses after v. Græfe, and 6 per cent. after Jacobson. Blessig had only $10\frac{5}{10}$ per cent. of curable and incurable failures after Jacobson, and $13\frac{5}{10}$ per cent. after v. Græfe.

the case-books. This probably meant nothing worse than $\frac{1}{10}$, according to the general acceptation of those terms, and these cases are therefore to be added to the successes $< \frac{1}{10}$.

As regards the results $< \frac{1}{10}$, we notice:

S $\frac{1}{15}$, in four cases, three of which were discharged with hyphæma and secondary cataract; one had recovered from a slight iritis.

S $\frac{1}{18}$, in two cases, one of which had a normal operation and recovery, the other having a slight prolapse of vitreous during the operation, but without any influence upon recovery.

S $\frac{1}{20}$, in five cases: one was discharged with secondary cataract; no anomaly could be discovered in the other four.

S $\frac{1}{30}$, in one case with iritis during recovery.

S $\frac{1}{60}$, in two cases which were discharged with secondary cataract.

S $\frac{1}{100}$, in one case with profuse hæmorrhage during the operation, with prolapse of vitreous, and spoon-extraction; recovery undisturbed.

S $\frac{1}{200}$, in one case: recovery was well under way with S $\frac{1}{200}$ on the sixth day when, from some unknown cause (not as a result of the operation), iritis ensued. The patient was discharged at his own request before recovery, so that the final result was unknown. The other eye had been successfully operated upon some years before.

The three cases with S $\frac{1}{\infty}$ and one with S=0, have already been described.

It is remarkable that so many cases with normal operation and recovery showed such proportionately slight vision. There were no optical defects to account for this. Astigmatism perhaps, existed, which was not taken into account in the final test of vision.

In conclusion, I would state that I do not mean this paper to be polemical against v. Graefe's method; it is based simply upon the convictions of scientific truth. I desired only to call attention to a method which has perhaps been too little tested and too quickly abandoned. The last word

must be spoken by the statistics themselves, weak in numbers as they undoubtedly are. Perhaps they gain in value from extending over so many years. At all events the method suggested has been tried again and again, and convinced us that with a normal operation it offers an almost absolute certainty of success.

JACOBSON. Ein neues und gefahrloses Operationsverfahren zur Heilung des grauen Staares. Berlin. 8°. 1863.

——— Zur vorläufigen Verständigung über meine Extractionsmethode. *Klin. Monatsbl.*, pag. 331. 1863.

——— Ueber die Cataract-Operation mit Lappen. *A. f. O.*, Bd. ix, 2, 1863.

——— Zur Lehre von der Cataractextraction mit Lappenschnitt. *A. f. O.*, Bd. x, 2, pag. 78, 1864.

——— Ueber die Zulässigkeit des Chloroforms bei Staaroperationen. *A. f. O.*, Bd. xi, 1, pag. 114, 1865.

BRAUN. Beitrag zur Heilung des harten Staares. *A. f. O.*, Bd. xi, 1, pag. 200, 1865.

JACOBSON. Ueber einzelne Heilungsvorgänge nach der Staarextraction. *A. f. O.*, Bd. xi, 2, pag. 166, 1865.

v. GRÄFE. Ueber modificirte Linearextraction. *A. f. O.*, Bd. xi, 3, pag. 1, 1865.

——— Nachträgliche Bemerkungen über modificirte Linearextraction. *A. f. O.*, Bd. xii, 1, 1866.

KNAPP. Bericht über 100 Staarextractionen. *A. f. O.*, Bd. xiii, 1, pag. 85, 1867.

v. GRÄFE. Notiz über die Linsenentbindung bei der modificirten Linearextraction. *A. f. O.*, Bd. xiii, pag. 549, 1867.

STEFFAN. Erfahrungen und Studien über die Staaroperation. Erlangen, 1867.

v. HASNER. Die neueste Phase der Staaroperation. Prag, 1868.

v. GRÄFE. Ueber v. Hasner's Kritik der Linearextraction. *Klin. Monatsbl.*, Bd. vi, 1868.

——— Noch ein Wort an den Verfasser der "neuesten Phase." *Klin. Monatsbl.*, Bd. vi, 1868.

JACOBSON. v. Gräfe's neueste Cataractextraction und die Vertheidiger des Cornealschnittes. *A. f. O.*, Bd. xiv, 2, pag. 247, 1868.

PAULSEN. Beitrag zur Statistik der modificirten Linearextraction. Inaug.-Diss., Kiel, 1868.

KNAPP. Bericht über ein zweites Hundert Cataractoperationen. *A. f. O.*, Bd. xiv, 1, pag. 285, 1868.

——— Report and remarks on a third hundred of cataract extractions. ARCH. OF OPHTH. AND OTOL., i, p. 103, 1869.

DANTONE. Beiträge zur Extraction des grauen Staares. Gekrönte Preisschrift. Erlangen, 1869.

STEFFAN. Klinische Erfahrungen und Studien. Erlangen, 1869.

v. GRÄFE. Ueber den peripheren Linearschnitt. *Klin. Monatsbl.*, Bd. viii, 1870.

STILLING. Ein Aphorismus über den Erfolg der neuen Staaroperationsmethoden. *Klin. Monatsbl.*, Bd. viii, 1870.

STEFFAN. Offene Zugeständnisse an v. Gräfe's peripheren Linearschnitt. *Ibid.*, 1870.

POMIER. Relevé statistique des opérations pratiquées dans l'année 1869 à la clinique du Dr. Wecker, 1870.

v. HASNER. Ueber die Staarextraction. *Prager Vierteljahrsschrift für pract. Heilk.*, 1871.

LORING. Remarks on cataract. Reviewed, *Klin. Monatsbl.*, Bd. ix, 1871.

TAYLOR, BRIBOSIA. Discussion über Staaroperation. *Klin. Monatsbl.*, Bd. x, 1872.

JACOBSON. Widerlegung der neuesten Angriffe gegen v. Gräfe's Linearextraction. *A. f. O.*, Bd. xviii, 1, 1872.

JEAFFRESON. On cataract extraction. *Lancet*, ii, Dec., 1872.

WATSON. Flap extraction of cataract. *Lancet*, ii, 1872.

LOGETSCHNIKOFF. Ueber die von ihm in den Jahren 1872 and 1873 gemachten Extractionen, 1873.

v. WELTZ. Ueber Linearextraction. *Klin. Monatsbl.*, p. 370, 1873.

——— Die Iridectomie der peripheren Linearextraction vorausgeschickt. Würzburg, 1873.

——— Discussion über die verschiedenen Methoden der Cataractextraction. Sitzungsbericht der Société méd. de Paris. Rev. in *Klin. Monatsbl.*, 1873.

WARLOMONT. Cataracte. Dictionnaire encyclopédique des sciences médicales, Paris, 1873.

——— Sur l'extraction de la cataracte. *Ann. d'Ocul.*, Bd. lxxi, p. 5, 1874.

CLASSEN. Ueber die beste Methode der Cataractextraction. *A. f. O.*, Bd. xx, 2, 1874.

KLEIN. Ueber sympathische Ophthalmie nach Staaroperationen. *Klin. Monatsbl. f. A.*, p. 334, 1874.

v. ARLT. Operationslehre in Gräfe-Sämisch, Bd. iii, 1874.

H. DERBY. Bericht über 64 Staaroperationen. *A.f.A. und O.*, iii, 74, 1874.

ADAMÜCK.—Zur Frage über die Giltigkeit der Cataractextractions-Methode. *Klin. Monatsbl.*, Bd. xii, p. 81, 1874.

HIRSCHBERG. Zur Statistik der Cataractoperationen. *A. f. A. und O.*, iv, 452, 1875.

BLESSIG. Bericht über die in den Jahren 1869–75 in der St. Petersburger Augenheilanstalt ausgeführten Staarextractionen. *Petersburger Med. Zeitschr.*, Bd. v, 1875.

v. WECKER. Die periphere Lappenextraction. *Klin. Monatsbl.*, p. 366, 1875.

BECKER. Pathologie und Therapie des Linsensystems. Gräfe-Sämisch, Bd. v, Cap. 7, 1875.

KLEINGÜNTHER. Ueber die Erfolge, welche durch die Jacobson'sche Extractions-Methode in der Greifswalder Klinik, etc. Inaug-Diss., Greifswald, 1875.

SCHIESS-GEMUSEUS. Kurzer Bericht über 200 Staarextractionen. *A. f. O.*, Bd. xxi, 1, 1875.

WOLFE. Lettre sur l'extraction à lambeau périphérique. *Ann. d'Ocul.*, Bd. lxxv, p. 305, 1876.

HIRSCHBERG. Ueber die peripherlineare Staarextraction. *Berl. Klin. Wochenschr.*, No. 1, 1876.

MARTIN. Sur les causes ordinaires d'insuccès dans l'extraction de la cataracte de Morgagni, etc. *Ann. d'Ocul.*, janv., fevr., 1877.

ENGELHARDT. Bericht über 100 Scleralextractionen. München, 1877.

STOEBER. Description du procédé quasi-linéaire simple ou composé, etc. Paris, 8°, 1877.

HORSTMANN. Neuere Erfahrungen über die Operation des grauen Staares. *D. Med. Wochenschr.*, No. 24, 1877.

H. KNAPP. Report and remarks on a fourth and a fifth hundred of cataract extractions. These ARCH., vi, p. 7, 1877.

BÄUERLEIN. 100 Scleralextractionen nach v. Gräfe. Rev. in *C. f. A.*, April, 1873; 1878.

A. GRÄFE. Die antiseptische Wundbehandlung bei Cataractextractionen. *A. f. O.*, Bd. xxiv, 1, 1878.

LANDESBERG. Bericht über 123 Staaroperationen. *A. f. O.*, Bd. xxiv, 3, 1878.

SCHMIDT. Beitrag zur Statistik der modificirten Linearextraction. Inaug.-Diss. Kiel, 1878.

H. KNAPP. Report and remarks on a sixth hundred of cataract extractions. These ARCHIVES, viii, p. 200, 1879.

RYDEL. Bericht über Staar und Staaroperation. Rev. in *A. f. O. und O.*, Bd. viii, 1879.

HIGGENS. Remarks on 150 operations for extraction of cataract. *Lancet*, xi and xii, 1879.

v. WECKER. De l'extraction à lambeau périphérique combinée. *Ann. d'Ocul.*, lxxxi, 1879.

——— Die combinirte periphere Lappenextraction. *Klin. Monatsbl.*, p. 169, 1879.

——— Linearschnitt und Lappenschnitt. *Klin. Monatsbl.*, p. 396, 1879.

LANDOLT. Ueber Staaroperationen. *C. f. A.*, August, September, 1879.

SNELLEN. Ueber die antiseptische Methode bei Augenoperationen. Verhandlungen des Congresses in Amsterdam, 1879. *C. f. A.*, Oct., 1879.

WOLFE. How to obviate the risks of failure in operations for cataract. *Lancet*, ii, p. 827, 1879.

KNAPP. Ueber Staaroperation. *C. f. A.*, April, 1880. Extract from an article in Trans. Am. Med. Assoc., 1879, p. 443.

SCHNEIDER. Ueber sympathische Erkrankung des Auges nach Staaroperationen. Inaug.-Diss. Rev. in *C. f. A.*, April, 1880.

HASKET DERBY. 54th Annual Report of the Massachusetts Charitable Eye and Ear Infirmary for 1879. Rev. in *C. f. A.*, 1880.

BORYSIEKIEWICZ. Beiträge zur Extraction des grauen Staares der Erwachsenen. *Klin. Monatsbl.*, p. 199. 1880.

HOCK. Cataract. Eulenburg's Real-Encyclopädie, 1880.

STRASSER. Beiträge zur Anwendung der Desinficientien in der Ophthalmologie. Inaug.-Diss. Bern, 1879. *Klin. Monatsbl.*, Bd. xviii, p. 93, 1880.

FRÖHLICH. Ueber Antisepsis bei Augenoperationen. *Klin. Monatsblätter*, Bd. xviii, p. 315, 1880.

Compare further: COHN's statistische Zusammenstellungen in *Nagel's Jahresbericht* für 1870—1877.

Dr. JANY. Bericht über die Wirksamkeit seiner Augenklinik, 1875, '76, und '77, 1878, 1879.

DOR. Rapport annuel de la clinique ophthalmologique de M. le professeur Dr. Dor. Lyon, 1878.

——— Compte-rendu statistique de la clinique ophthalmologique de l'université de Berne (du 6 mai, 1867, au 15 octobre, 1876).

EWERS. *Jahresberichte*, 1871, 1872.

SCHÖLER. *Jahresberichte*, 1874–1879.

JUST. Bericht, etc., 1871, 1872, 1874–1877.

PAGENSTECHER. Bericht über, etc., 1872–76.

Clinique ophthalmologique du Dr. De Wecker, à Paris. Relevé statistique par le Dr. Martin 1872, Dr. Masselon, 1873–1876.

BARDE. Clinique pour les maladies des yeux. Compte-rendu. Genève, 1873.

PECULIAR CIRCULATION IN RETINAL ARTERIES AND VEINS.

By Dr. PETER A. CALLAN, N. Y.

Peter J., æt. 66, American, an active, robust man for his years, enjoying good health, and accustomed to out-door life. Saw patient, for the first time, January 28, 1881, at the N. Y. Eye and Ear Infirmary. He complained of his left eye being blind, and gave the following history: Two days before coming to the infirmary, he rode uptown on the rear platform of a street-car. The wind was from the west, and he felt his left half of face quite cold; then a chilly feeling of his entire body, which continued until going to bed. Next morning, January 27th, on getting up, he soon discovered that his left eye was totally blind. Toward night he could see a bright light when held in a particular direction.

January 28th, 3 P.M.—Examined patient's vision. O. D. + 24; V = $\frac{20}{30}$.

O. S.—Could see a light when held downward and outward two feet away; all other parts of fundus, no light-perception.

Ophthalmoscopic examination.—O. D., slight incipient cataract in the periphery of lens; other media clear. Optic disc bluish-white. Between the disc and fovea centralis, a small piece of cholesterine in the retina.

O. S.—Some incipient cataract in the periphery of the lens; media otherwise clear. Optic disc bluish-white like O. D.; outline clear and well defined; no swelling. Vessels somewhat reduced in size, but none of them totally empty. The circulating blood in all the vessels, arteries, and veins, presented an unusual appearance. The blood stream did not completely fill the vessels. It appeared as if red and white discs were rapidly coursing through both arteries and veins. The white spaces were only half the length of the red, the red being about twice the diameter of the

vessel in which it ran. The flow was continuous and not synchronous with the heart's action. The red discs were the blood ; the white discs were empty spaces. The mac. lutea was recognizable as a dull-red spot, one-tenth the size of the optic disc. The retina in the immediate vicinity, extending two-thirds of the way to the disc, was infiltrated by an opaque, grayish exudation—œdema.

January 29th.—The vessels are well filled and normal in appearance.

February 9th.—The œdema about mac. lutea has absorbed, leaving four minute grayish spots between disc and fovea centralis.

February 16th.—Is able to count fingers at two feet when the hand is held down and outward. All other parts of visual field are deficient in light-perception.

This condition of circulation has been observed first by Ed. v. Jaeger and by v. Graefe, but only in the veins. It was present in the classic case of embolism of v. Graefe. The case under consideration was not one of embolism. To me it appeared to be one of retrobulbar compression of the optic nerve within its sheath, due to inflammatory product; the exudation not extensive, so as to cause marked compression, but sufficient to slightly reduce the calibre of the vessels ; the heart's action for the time being not able to completely fill the vessels.

SARCOMA OF THE CHOROID, CILIARY BODY, AND IRIS.

By J. S. PROUT, M.D., of Brooklyn, N. Y.,

and

CHARLES S. BULL, M.D., of New York.

I.—*Clinical history and operation.* By J. S. Prout, M.D.

Mrs. Ellen McA., æt. 35, presented herself for treatment at the Brooklyn Eye and Ear Hospital, December 4, 1880, with the statement that three weeks previously sight began to fail in the left eye without any known cause and without pain, and that two days previously a change of color was noticed in the lower part of the iris, which presented a slightly nodulated appearance, the fibres being interspersed with small whitish masses, with an accompanying development of blood-vessels. There was no clearly-defined tumor. The affected part of the iris was immovable, while that above reacted normally to the stimulus of light, and dilated after the instillation of a weak solution of atropine. The visual field was found to be defective upward and inward. Behind the pupil, close to the equator of the lens, the ophthalmoscope showed in the lower and outer quadrants a pinkish mottled growth springing from the ciliary body or the anterior portion of the choroid, and evidently extending back in the choroid, as there was a detachment of the retina that extended well up toward the nerve disc. The media were clear, and the upper half of the ball and fundus seemed entirely normal. There were no glandular enlargements to be found. The patient was in the seventh month of utero-gestation, and in fair general condition.

The diagnosis of sarcoma of the iris, ciliary body, and, most probably, choroid was made. Dr. E. G. Loring, one of the consulting surgeons to the hospital, and Drs. H. D. Noyes and C. S.

Bull saw the case soon after, and agreed with me as to the diagnosis and the necessity for immediate enucleation.

On December 14th, under ether, the ball was removed without accident; the patient experienced no bad effects from the ether, and the wound healed promptly. A little anxiety had been felt lest premature labor might be caused, but she went to full term and was delivered of a fine child.

April 9, 1881.—Up to this time there has been no sign whatever of recurrence of the tumor. She is under treatment for a recently occurring hyperæmia of the conjunctiva of the right eye. The left conjunctiva is chemotic from the constant wearing of the artificial eye.

II.—*Microscopical examination.* By CHAS. S. BULL, M.D.

The eyeball was hardened in Müller's fluid, and subsequently in alcohol. It was opened in the horizontal plane, and first examined macroscopically. The cornea, sclera, and optic nerve were apparently normal. The anterior chamber was somewhat lessened in depth by the slight bulging of the iris below. In the lower and outer quadrant the angle of the anterior chamber seemed to be closed by the prominence of the periphery of the iris. The iris was swollen and nodulated, and the swelling seemed to be continuous with the tumor or infiltration in the ciliary body and choroid. The pupil was open and the lens in place. The ciliary body and choroid were occupied by a growth, which extended for some distance back of the equator. The retina was detached over a corresponding region.

Under a *low magnifying power*, sections of the eyeball, extending as far backward as the posterior limit of the tumor, showed that the inner layers of the choroid were mainly involved, while the sclera, lamina fusca, and outer layer of the choroid were apparently intact. Proceeding toward the ciliary region, the infiltrated choroid rapidly grew enormously thick; but just before the ciliary region was reached the choroid became again much thinner. The ciliary body was very much hypertrophied by the growth of the tumor, and the neoplastic infiltration extended into the processes and brought the latter very close to the equator of the lens,

thus narrowing very materially the canal of Petit. The ciliary body was pushed forward by the infiltrated growth, and this in turn pressed the iris-periphery forward, closed Fontana's space more or less completely, and in some sections partially obliterated Schlemm's canal. The iris was very much thickened and infiltrated with the growth, but the main mass of the tumor seemed to overlie the iris, lying closely in contact with it, and extending well down toward the pupillary margin. This entirely closed the angle of the anterior chamber in this region, and apparently caused a bulging outward at the limbus by the mass of cell-growth. At the iris-angle there was considerable pigment, some free, some contained in cells, which seemed to cling to the posterior surface of the cornea. The cornea was apparently intact. The growth did not seem to involve the retina, but pushed the hexagonal pigment cells before it as it grew inward toward the axis of the eye. The growth appeared in places very vascular. In some of the sections examined, the pigment massed in the angle of the anterior chamber was considerable in quantity. In a few sections the canal of Schlemm was visibly patent, though its calibre was reduced in size; but in nearly all of the sections examined, Fontana's spaces were apparently filled up and obliterated.

Under a *high power* it was seen that almost the entire thickness of the choroid was infiltrated by the masses of cell-growth. In the outer layers of the choroid the cells were small, round, nucleated, and granular, and densely packed together; but in the innermost layers of the choroid the cells became more fusiform, until, next to the lamina vitrea, they were all fusiform, and so arranged as to present very much the appearance of fibroma. There was considerable connective-tissue structure in this part of the tumor, with here and there an irregular attempt at the formation of alveoli. This part of the tumor was not especially vascular, but as the ciliary region was reached the vessels became more numerous. In this region also the outer layer of the choroid was much less infiltrated with cell-growth, and the muscular tissue of the ciliary body was more plainly discernible. The cellular growth in the ciliary body and

processes consisted mainly of fusiform cells. As the region of the peripherical attachment of the iris was reached, it was seen that Fontana's spaces were not entirely obliterated, though the mesh-fibres were crowded more closely together. A large mass of cells lay between the ciliary processes and the root of the iris, pushing the latter forward against the cornea; they were mainly fusiform in character. Schlemm's canal was open in all of the sections.

The infiltration of the iris tissue, and the neoplastic mass upon its anterior surface and in the anterior chamber, was composed entirely of round, nucleated, granular cells. The entire iris, as far down as the sphincter, was found infiltrated with small round cells. The masses of pigment between cornea and iris at the periphery of the chamber were either in irregular free clumps, or else contained in larger round or ovoid cells, apparently part of the neoplastic growth, and not pigment cells of the iris pushed forward by the tumor. In the anterior chamber, farther away from the angle, was a matrix of granular matter with large numbers of the same round cells, pigmented and unpigmented. These lay mainly against the cornea and were very numerous. At one or two points the membrane of Descemet seemed to be defective, and here the cornea appeared to be very slightly infiltrated with round cells. Reverting to the ciliary region, the epithelium on some of the processes was evidently hypertrophied, and the vascularity was quite marked. The fibres of the suspensory ligament were in place and apparently normal.

After a careful examination of a number of sections, it appears probable that this tumor was originally a choroidal growth, starting in the inner layers of the choroid, far forward near the ciliary body, and subsequently spread in both directions, forward into the ciliary body and iris, and backward through the choroid toward the posterior pole. The infiltration of the iris was probably the latest period of growth, though this must have been going on for some time in the periphery. There seems to be no special reason in this case why the tumor in the ciliary body and outer layer of choroid should have been made up of fusiform cells,

while the rest of the choroid and the iris contained only round cells. The sclera did not seem to be infiltrated at all; but from the slight signs already existing in the cornea, it was well for the patient that the eye was enucleated before rupture of the eyeball had taken place, and before the surrounding orbital tissue had become infiltrated.

The case must be classed as a sarcoma, unpigmented in the main, of choroid, ciliary body, and iris.

TWO CASES OF EXTRACTION OF SPLINTERS OF IRON FROM THE VITREOUS, WITH OBSERVATIONS ON THE DIAGNOSIS AND EXTRACTION OF STEEL AND IRON PARTICLES BY MEANS OF THE MAGNET.

By Dr. HERMANN PAGENSTECHER, of Wiesbaden.

Translated from the German by T. R. Pooley, of New York.

Case 1.—*Extraction with forceps; incision in the sclero-corneal margin; preservation of sight.*

J. M., æt. 41, a factory-hand, was struck, ten hours before presenting himself to me, upon the left eye by a piece of iron.

On the inner sclero-corneal margin was a small linear wound, corresponding to which there was a wound in the iris; the iris was fastened in the wound, displacing the pupil inward. Lens clear; nothing abnormal to be seen in the vitreous. S=$\frac{15}{30}$. According to the direction taken by the foreign body, as described by the patient, if it had not fallen out, it must have been located in the lower part of the vitreous, near the ora serrata. A defect in the upper part of the field of vision, which could be made out on the following day, was in favor of this view, although with the ophthalmoscope nothing could be detected. In the course of the next few days the defect in the field disappeared.

The patient complained of pain, and on the fourth day, when he looked forcibly downward, I saw a yellowish nodule projecting into the vitreous. This indicated precisely enough the location of the foreign body. and I at once proceeded to attempt its extraction.

I made an incision, with a lance-shaped knife, in the inner and lower part of the sclero-corneal margin, cut out the corresponding portion of iris, went in with a fine bent sound between the margin

of the lens and the ciliary body, touched the foreign body, and then introducing a pair of simple tooth-forceps in the same direction, was fortunate enough to grasp and withdraw, in the first attempt, an irregular splinter of iron, 2½ *mm.* long and 1 *mm.* wide. In the process of the extraction the border of the lens itself was unfortunately wounded. Vitreous did not escape, although it presented in the wound. Healing took place without any reaction, though the opacity of the lens slowly increased, so that the patient could be discharged four weeks after the extraction. The eye was quite free from irritation; fingers were counted at 11′, and T was normal. Five months later, the cataract, having completely matured, was extracted at the request of the patient. The operation was without accident. During the course of healing, iris became engaged in the scar, so as to give rise to the formation of a simple secondary cataract, with which, four weeks after the extraction, the patient was discharged.

The eye was again free from any irritation, and with + ⅓ fingers were promptly counted at 3 metres. Discision of the secondary cataract to be made later.

CASE 2.—*Extraction with Fröhlich's electro-magnetic probe; scleral wound; termination in phthisis bulbi.*

A mason, 28 years old, about eight hours before his admission to the institute (late in the evening), while breaking stone with an iron hammer, was struck by something on the left eye.

Status præsens.—Perforating wound of the upper lid, and, corresponding to the same, a small linear one near the inner corneal margin in the sclera; cornea, iris, and lens intact. Blood on the floor of the anterior chamber.

O. S.—In the middle of the vitreous chamber, a pretty large air-bubble, and downward and outward from it, a striped opacity in the vitreous, which terminated in a considerable hemorrhage on the floor of the vitreous.

The retina in the vicinity is hazy, and shows a whitish spot (perhaps retinal and choroidal wound). Above and inward a small air-bubble still visible.

Other parts of the vitreous still remain clear. Corpus alienum nowhere to be discovered. S=$\frac{2}{3}\frac{0}{0}$. Eyeball painful. Pronounced defect of the field upward. As I could not undertake any operative procedure in the evening, atropine and a pressure-bandage were ordered. Pain during the night. The following

day an entirely different appearance presented itself. Cornea and aqueous hazy, iris swollen, eye deeply injected and painful. Inspection of its interior impossible. Partly in the hopes that the inflammation would again subside, and partly because the parents had not yet made up their minds to consent to enucleation, if necessary, I refrained for the present from any operative procedure. On the third and fourth days the inflammatory process had increased, and panophthalmitis seemed likely to ensue. As, in the meantime, the patient and his relatives had consented to any operation, I did not believe that I was justifiable in not making the attempt at its extraction with the magnet in the hopes that the foreign body might prove not to be of stone but iron. With the patient profoundly under the influence of chloroform, I made a small incision in the sclera, in the situation of the previously observed blood-clot, where the foreign body was supposed to be imbedded. Through this I introduced the sound and moved it about. Although I heard nothing myself, both my assistants and the nurse heard a loud click of the foreign body against the sound. The diagnosis of iron was thus verified. In the first and second attempts, however, the foreign body was not withdrawn, but after I had slightly enlarged the wound I drew out, in the first trial, a rough, angular splinter of iron, $2\frac{1}{2}$ *mm.* long, by 2 *mm.* wide, and 1 *mm.* thick. A slight loss of vitreous tinged with blood followed; the eye was closed with an antiseptic carbolized bandage.

For the first few days every thing went on as well as could be desired ; the cornea became entirely clear ; the wound healed without any great reaction. On the third day the patient could count fingers at 1-2′ ; but very soon thereafter a lingering irido-choroiditis set in, with the formation of exudation in the vitreous, which led to shrinking of the globe. The shrinking, as well as the indrawing of the scar, was comparatively much more pronounced in the region of the perforating wound of the corpus ciliare than it was in the scleral wound which was made for the extraction of the foreign body. The patient was discharged with a phthisical eyeball.

I had already, a short time before the admission of the second case into the institute, procured Fröhlich's sound, and experimented with it on the eyes of rabbits and calves, in which foreign bodies had been introduced in every direction; their extraction in each case was accomplished with

the greatest ease. The circumstance which in the above-related case made it doubtful at first whether we had to deal with a stone or iron fragment in the vitreous, gave me the incentive to make the experimental inquiry, whether I could not succeed in proving from the existing condition, by the use of the magnet, if we had a steel or iron foreign body in the vitreous, especially as T. R. Pooley, in a visit which he made to our institute during the course of the summer, said that he had been successful in so doing. Pooley's paper, including his preliminary communication, was not yet known to me when I made my experiments; it had, however, already appeared in the American edition of these ARCHIVES, and in any case secures for him the priority of this valuable means of diagnosis.

I can only give my assurance that in my experiments also I soon was led to the necessity of rendering the foreign body magnetic. I accomplished this by repeatedly touching the eye under examination with a strong electro-magnet.

I allowed the needle used to indicate the presence and position of the suspected foreign body to rotate, as in a compass, on a fine needle; Pooley suspends the same by a fine thread, by which it is rendered more sensitive, although the difficulty of experimenting is thus somewhat enhanced. The results obtained by Pooley in his experiments, I can, on the whole, fully confirm.

Beyond a doubt, the method succeeds in determining both the presence and situation of steel and iron particles, presupposing, however, that the intruding foreign body is not too small, and, at the same time, too far removed from the enclosing membranes. My experiments extend especially to very thin and proportionally short bits of iron, which I introduced, by the aid of the canula of a Pravaz's syringe, into the vitreous or anterior chamber, and then pushed them out with a fine rod; experiments which I have previously published in these ARCHIVES, vol. i, No. 2.

I succeeded completely in the detection of the presence of such small fragments of iron wire, when they were situated

near the enveloping membranes, but failed in so doing when they lay in the interior of the vitreous.

Larger iron or steel particles will also be detected as well here as in the posterior segment of the globe near the papilla, when we succeed in rendering them sufficiently magnetic, and when a very sensitive magnetic needle is used in the experiment. On this point I have no personal experience. I must, however, draw attention to another point that, thus far, Pooley * has not mentioned, and which, under certain circumstances, may have the greatest diagnostic importance; namely, when I introduced a thin piece of iron wire into the middle of the vitreous, and undertook to render it magnetic by touching the eye with the electromagnet, I could, in every instance, through the dilated pupil, see that the foreign body followed all the movements of the magnet;† further, that it, even when the magnet was brought within a few millimetres, made appreciable changes of situation, and, besides, in opening and closing the current, jumped about in the vitreous.

I could, some time since, demonstrate this to a large society of physicians, in the eye of a rabbit, in which a bit of iron wire had lain for three weeks, and in which the vitreous remained quite clear.

This circumstance may, perhaps, in a certain proportion of cases, prove to be of sufficient importance not to be overlooked, viz., when the refractive media remain sufficiently clear to allow the foreign body to be seen; and, again, when the same is freely movable, but when nothing definite is known as to the presence and character of the foreign body, on account of turbidity, whether caused by extravasation of blood or exudation.

In all such doubtful cases, then, where the media remain clear enough to permit of a direct observation, we shall do well to first make a trial with a strong magnet, and if this causes the least movement to occur, the diagnosis of the presence of a steel or iron foreign body is made. This experiment will also be more successful when the foreign

* Compare his paper, these ARCHIVES, vol. ix, p. 225. (English edition.)

† Dixon has already availed himself of this circumstance in the extraction of a fragment of iron from the vitreous.

body is itself rendered magnetic by bringing a magnet in contact with the eye. If this experiment should fail, it is likely that the foreign body is imbedded in the tunics of the eye, or closely united to them, and then we have, as a second resource, the examination with the magnetic needle.

We may well doubt whether attempts to extract a piece of iron from the vitreous with Fröhlich's magnetic sound will succeed, when it is impacted in the coats of the eye, or enveloped in a mass of exudation, which has its origin in the same, and is, therefore, firmly united with them.

That this is, however, sometimes possible, is demonstrated by the following case:

While introducing a piece of thin iron wire into the vitreous of a rabbit through the canula of a Pravaz's syringe, in withdrawing the trocar the foreign body followed it, and one end of it impinged against the walls of the globe. Ten days later an exudation had formed around this end of the foreign body, partially enclosing and uniting it to the globe. I now tried to extract it with Fröhlich's sound, making the incision for that purpose in the sclera, some distance from the former wound.

When the sound was introduced into the vitreous and brought in the region of the foreign body and withdrawn, I could plainly observe how the sclera sunk inward, forming a marked depression, which disappeared entirely as soon as the sound was removed. It was not until I had introduced the sound three or four times that I succeeded in loosening the foreign body from its attachments (which must, at all events, have been very firm, as shown by the bulging of the sclera), and also in extracting it.

This rabbit's eye, in common with those of others in which the foreign body was removed by Fröhlich's sound, entirely recovered, with only a slight opacity of the vitreous, provided the foreign body itself or the operation for its introduction did not produce too great a reaction.

With respect to the operative procedure with Fröhlich's sound in man, I may be allowed to make the following remarks:

If the foreign body has penetrated the cornea and lens, either with or without passing through the iris, an attempt should, by all means, be made to extract it from the front by means of a sclero-corneal wound, combined with iridectomy, by first removing the lens and then entering the sound into the vitreous, or by introducing it between the lens and ciliary body. Such an attempt is, under all circumstances, less dangerous than an incision in the sclera. It is quite different when the lens remains uninjured; in such a case one would hesitate, except in rare instances (as in the first mentioned by me), to resort to this method, but would rather extract through the sclera.

As to the size of the wound for the purpose of introducing the sound, I would advise that it should be made at least twice as large as the original wound or scar.

The prognosis, leaving out of question the size of the foreign body, and any uncleanliness which may be attached to it, also depends very much on the place of entrance, and is especially grave in those cases where the ciliary body is penetrated, because of the subsequent considerable retraction of the scar. In apparently favorable cases even, the final result of phthisis bulbi cannot be averted; and such cases as those related by McKeown, and later by Hirschberg, in which the visual power was so perfectly preserved, will, in spite of the magnet, belong to the greatest rarity.* At any rate, the introduction of the magnet for the purpose of removing fragments of steel and iron from the eye, and for their diagnosis, is a considerable step in advance, and we are now in a condition to save many an eye which would otherwise be irreparably lost.

* Knapp (these ARCHIVES, vol. vii, pag. 345), it is true, reports that out of seventeen cases, five retained the visual power. It is to be considered, however, in this connection, that a larger number of favorable cases than those having an opposite course are published; and that these five represent but a small percentage of the entire number of extractions of foreign bodies from the vitreous, either successful or unsuccessful.

ON THE EXTRACTION OF CATARACT IN ITS CAPSULE, WITH A REPORT OF ONE HUNDRED AND SEVENTEEN RECENT CASES.

By Dr. HERMANN PAGENSTECHER, of Wiesbaden,

SURGEON-IN-CHARGE OF THE WIESBADEN OPHTHALMIC HOSPITAL.

COMMUNICATIONS FROM THE OPHTHALMIC HOSPITAL AT WIESBADEN; SECOND PAPER.*

Translated by James A. Spalding, M.D., of Portland, Maine.

A PAMPHLET which I published in 1877, entitled, "Die Operation des grauen Staares in geschlossener Kapsel" (*On the extraction of cataract in its capsule*), described the details of an operation for cataract extraction, which was first employed, and, at a later date, greatly modified, by my late brother, Alexander Pagenstecher. The same work described the indications for the performance of the operation, as well as the results of 353 recent cases, and contained a list of all cataracts which we had extracted by this method during the ten years ending December, 1875.† At the same time was added a brief note on the historical development of the operation.

Although the percentage of losses was then but small, we expressed the hope that, in the future, it could be even decidedly lessened. Especially were we able to predict that, with more precise indications for the operation, the percent-

* Compare these Archives, vol. viii, page 243.

† The same brochure (Wiesbaden, J. F. Bergmann) contains the results of 493 other cataracts, which were operated upon during the same period, partly by the flap method, and partly by the modified linear extraction, without removal of the capsule.

age of those cases in which the operation could not be perfectly performed, that is to say, the cases in which the capsule bursts during the extraction, and a portion of adherent cortex is left behind, would be very much lessened. We also added that our skill was increasing with each operation, and that, in the most recent period, we had resorted strictly to the antiseptic method in all these operations.

These three points (precise indications for the operation, skill from repeated practice, and the use of antiseptics) have greatly contributed to elevate our method to a height, at which, without exception, it surpasses all others. In all medical matters, I am in the habit of observing temperately and without prejudice, an impression of which many readers must already have gained from my first book. But, for all that, I affirm, from my experience during the last five years, that this method will, in time, be universally adopted in ophthalmology, and that, for distinct forms of cataract, it will become, and remain, the normal one. Indeed, I go so far as to say, that we make a great mistake—will the older operators pardon my expression?—when we operate on *cataract after irido-choroiditis*, or on *hypermature* or *Morgagnian cataracts*, in any other way than by extraction in the capsule. For, in all these cases, it is not only easier to operate by this method than by any other, but it is far less dangerous to the eye, while, at the same time, it procures greater and more permanent vision for the patient. The recognition of these latter facts seems to gain ground very slowly, for I find but few cases of extraction of cataract in its capsule in the literature of recent years.* The text-books either pass over the method in haste, or criticise it without the authors knowing anything about it from their own experience. In Becker's work, "On the pathology

* Every one who is acquainted with my brother's first report, as well as my own, already cited, will deem it right for me to say a few words about a paper by Landesberg (of Philadelphia) in *v. Graefe's Archiv*, Band xxiv, Abth. iii, pag. 67, 116, etc. In the first place, my brother never left a scleral bridge, as Landesberg believes (but sometimes a conjunctival bridge), before completing the section; secondly, I think it very bold in Landesberg, *without fixation of the globe*, to introduce his "voluminous traction instrument" (spoon) into the eye, for the purpose of removing the lens, for it is then easy to see why "the spoon crushes and tears the interior of the eye." When Landesberg operates in this way, he would do well to call his operation after his own name, and not after that of Pagenstecher.

and therapeutics of the lens" (page 319), we find the following very apt remarks: "In all the methods which we have mentioned, only the entire contents of the capsule can, at the best, be removed from the eye. On the other hand, if the capsule remains in the eye, it is very difficult to remove all the cortical fragments, for those at the equator lie in the capsule as if in a pocket, and even in the region of the coloboma, where they can be seen with the eye, they cannot always be removed, in spite of all our efforts. It is plain enough, that if we could either discover a method by which all cataracts could be extracted in their capsules, without inflicting greater injury upon the eye than is done in any of the usual methods of extraction; or, at best, so far perfect our diagnosis of the firmness of the capsule at the zonula, and in the fossa patellaris, that we could with certainty recognize the cases in which the lens could be extracted in its capsule, such a method would maintain forever a prominent place in operative ophthalmology."

During the many years in which we were occupied in developing and perfecting our method of operation, we had already set up the two postulates mentioned in Becker's last sentence, and there can be no doubt but that we have gained a certain degree of perfection, both in our diagnosis and our method of operating. For, if we can diagnose the nature of cataracts so accurately, that in one hundred and seventeen extractions in the capsule, we have observed only four cases of rupture of the capsule, I believe that we have reached a degree of certainty which leaves nothing to be desired. In so far as concerns the degree of injury to the eye, that is to say, the greater or less hazard of the operation, the successes give the key, and I refer the reader to our statistics.

One reason why this method has been so little employed is, that every one likes to continue with the operation which he first learned and practised, and which has probably so far given satisfactory results; secondly, everybody imagines that it is a violent procedure to pass the flat spoon into the eye, for the purpose of removing the lens. Then, it is a common opinion that loss of vitreous endangers the eye;

further, we are told that we are never sure of removing the lens with the whole of the capsule; and, finally, many have never seen the operation, and hence have had no chance for deciding upon its merits from their own knowledge.*

In the first place it is absolutely necessary for us to be sure what cases are to be operated upon by extraction in the capsule and what cases are not. Our own observations, combined with a moderate degree of attention, soon throw light on this point, and he who at first only ventures to employ the operation in the cases where it is undoubtedly the best,—such as cataracts after irido-choroiditis, pronounced hypermature cataracts, and Morgagnian cataracts—will soon gain more and more confidence in the operation, and discover for himself in what further series of cases it is indicated.

I have already attempted in my brochure to describe somewhat more closely the various forms of cataract which seem suitable for this operation, and on the whole I still hold to the indications there expressed. However, the book does not profess to give an exhaustive treatment of the subject under discussion. Just as in medicine, there are many things whose relations we discover after a certain degree of practice, without being able to describe them so that they can serve as a rule of conduct for others, so it is with many types of cataract.

There is but one important rule, which I will here lay down: *cataracts which have matured rapidly, say in the course of a few months, should never be removed in the capsule, but always by opening the capsule. In such cases the capsule does not obtain sufficient strength in comparison with that of the zonula.*

I am almost always sure beforehand whether I intend, in any given case, to extract the cataract with its capsule or without it. In only a few cases do I leave the question undecided until I have finished the section and the iridectomy. In these cases I take as a standard the behavior of the lens, as well as that of the vitreous. If the vitreous presses but slightly forward after evacuation of the aqueous

* Compare Dr. Adolf Meyer's letter from Florence, *C. f. A.*, 1880, 292.

and completion of the iridectomy, I extract at once with the capsule. I do the same in case of moderate pressure on the part of the vitreous, if I have noticed a greater or less change in the position of the lens (dislocation) while making the section. If, on the other hand, the lens remains quite firmly *in situ* during the section, and if at the same time the pressure in the vitreous is increased, I omit the extraction with the capsule.

The great disadvantage of our method, in the opinion of most oculists, is the necessity of introducing a spoon into the interior of the eye. The common idea is that we push the spoon far into the vitreous, work about with it in the dark, possibly scrape the opposite portion of the ciliary body with the anterior edge of the spoon, and, finally, that prolapse as well as loss of vitreous are wholly unavoidable and very frequent. I can only say that all these ideas are entirely wrong. Let us not forget, in the first place, that after evacuation of the aqueous and completion of the iridectomy, the lens and its adnexa usually press forward, and that the tension of the vitreous decreases quite noticeably; secondly, that in *all suitable cases*, we have a capsule which is very strong in comparison with the zonula; and, finally, that the lens adheres very slightly, if at all, to the fossa patellaris. Now, it is these very circumstances which enable us, in almost every case, to pass the spoon between the posterior capsule of the lens and the anterior surface of the vitreous. For in this manœuvre we gently push the vitreous backward, in its state of diminished tension, with the posterior surface of the spoon, without breaking its anterior limiting surface. If any one doubts the feasibility of this manœuvre, let him prepare a human vitreous *in toto*, and try to break open its limiting surface with a spoon passed over it in any possible tangent. Every one who tries this will soon convince himself that this is by no means easy, provided that the vitreous has a chance to yield a little. In the same way we can avoid any coarser injury to the ciliary body or iris by manœuvering correctly with the spoon, for, in grasping the lens, the spoon can never reach the lower or lateral portions of the ciliary

body. On the contrary, the ciliary region, in case of extraction with the capsule, never has to undergo such pressure and distortion as during the usual methods; that is to say, how long we often have to press upward with the hard rubber spoon on the lower sclero-corneal margin in extraction upward, or downward on the upper lip of the wound until the nucleus can accommodate itself to the opening, and so glide out of the cortical mass! In my opinion, the subsequent reaction on the part of an eye is the best standard for correctly judging the stress of the injury inflicted by the operation. Now in this respect, it is hard to find any eye which has undergone extraction, more free from irritation in 24 or 48 hours after the operation, than one in which the lens with its capsule has been extracted with the spoon. It is indeed true that in my brochure I spoke of the introduction of the spoon as "a greater interference," but this passage referred only to eyes which in our experience were unfitted for extraction with the capsule; hence my own words have caused misunderstandings. In spite of what I then said my views have undergone slight modifications, so that while I was once inclined to ascribe many unfavorable results to the introduction of the spoon, I am now quite sure that such an opinion was unjustifiable, and that these results were due to other prejudicial influences. To-day, therefore, I am less inclined than ever to ascribe any harmful influence whatever to the introduction of the spoon in *cases suitable* for our operative method.

It gave us great pleasure to see by a late paper of Borysiekiewicz * that he was also aiming in a series of cataract cases at extraction in the capsule. He, like all the rest, dreads the introduction of the spoon—not from any special reasons given, but from purely theoretical grounds,—and, therefore, extracts the cataract in its capsule with a sharp hook. He thus performed twenty-three successful operations in twenty-eight cases. Can there be any better proof of my views of an atrophy of the zonula, of a relative increase in the strength of the capsule, and of a loosening of

* *K. M. f. A.*, 1880, p. 199.

the lens in its fossa, than the results of these operations? I have, to be sure, never tried his method, because I have no reasons whatsoever to depart from my own. I grant that it is applicable to hypermature, shrivelled, or black cataracts, etc., but it cannot be resorted to in all those forms of Morgagnian cataract which, in my opinion, are much more suitable for an operation by our method. I desire here to express the wish that Dr. Borysiekiewicz may conquer his prejudices against the flat spoon, and I am sure that when he has gained skill in the manipulation of this instrument he will never lay it aside.

We now pass to the question of the prolapse and loss of vitreous in the percentage of which our statistics show a decrease in later years. Although it is, of course, more favorable, so far as concerns a rapid recovery, if no vitreous is lost, my large experience will not allow me to regard such an occurrence as unfortunate, provided that the whole operation has been performed with strict attention to the antiseptic method. On this last point I lay great stress, for in the course of years I have convinced myself that we gained so much the better results in extractions with the capsule, the more scrupulously we adhered to antiseptics. In 1875 we began to use the antiseptic method cautiously, as we had to learn how the operated eyes would react. In the course of time we became bolder and resorted to stronger antiseptics, which we use in the following manner: For some days before the operation the patient has a good bath, while his face and hair are most thoroughly cleansed. At evening the eyes are sprayed for some time with a two-per-cent. solution of carbolic acid, and for half an hour later, fomentations of the same strength are applied. On the day before the operation, the fomentations are repeated, in order to disinfect the tear passages. If there is the least doubt about the latter, they are syringed out with the same solution. Although the fomentations have never irritated the conjunctiva sufficiently to lead me to postpone the operation, I observed this condition once after syringing the tear passages, but I suspect that the solution penetrated more or less into the submucous tissues. The instruments are

all carefully cleansed and disinfected before the operation, which is always performed under carbolic spray (two per-cent.). This latter step we consider indispensable in order to disinfect our own persons as well as those of the assistants and attendants. During the operation, small bits of cotton moistened in the carbolic solution are at hand to remove any blood which may enter the eye. After completing the operation (I do not use atropia) I cover the eye with cotton saturated in the same solution, and over that apply clean wadding or charpie saturated in a ten-per-cent solution of carbolic acid. The thick layer of wadding is covered with a fine flannel bandage (over both eyes) which is not usually changed until forty-eight hours after the operation, and then under carbolic spray (two per-cent.).

The reaction on the part of the conjunctiva and skin of the eyelids varies a great deal. In most cases there is no reaction at all, in a few others the conjunctiva becomes slightly irritated and swollen. In only a few cases have I found the irritation so excessive as to compel me to abstain from the carbolic preparations after a few days' use. Still, I must emphasize the fact that I have never yet seen a case in which I considered that the carbolic preparations had retarded recovery, especially by causing reactionary symptoms on the part of the iris or vitreous. On the contrary, the experience which I have gained in later years from extraction in the capsule seems to prove without the shadow of a doubt, that we owed at least a part of our favorable results to the use of the antiseptic method, especially in those cases in which we had a greater or less loss of vitreous. Numerous observations in this respect, and especially a comparison with the course of recovery during the period when we used no antiseptics, have forced me to this firm conviction: In extraction with the capsule, we can pierce, cut, and break up the vitreous in every direction, and even evacuate the larger part of it without prejudicing the course of recovery or doing any harm to future vision, *provided that we do not infect the vitreous.* This is the point on which I lay the greatest stress, for the more healthy the tissue, the easier the infection. There can scarcely be a better soil for

septic matter than the tissues of the vitreous, and when Schmidt-Rimpler desires to prove its capacity for inflammation by injections of infective matter (blennorrhœa, secretions from the lachrymal sac), he only proves that the virus rapidly permeates the whole vitreous, infecting it *in toto*, and exciting a simultaneous inflammation in the surrounding tissues.

In so far as concerns opacities of the vitreous, the frequency of which, after our method of extraction, has been held up as a reproach, I refer partly to my earlier communication, and partly to the statistics given below. I merely emphasize the fact that it is a gross error to refer the extent of such opacities to the amount of vitreous which has been lost. The slight floating opacities which appear after prolapse or loss of vitreous, attached as they usually are to the cicatrix, merely indicate the curative reaction on the part of the incision; they never disturb vision, usually disappear with great rapidity, and are almost always hardest to find in those eyes which have suffered the greatest loss of vitreous. Those opacities which permeate the entire vitreous and disturb vision to a greater or less extent, are only observed when the cicatrization of the incision is interfered with, as well as after injuries, prolapse of iris, or cyclitis. The latter inflammation is, by the way, much less frequent since we have resorted to antiseptics. The opinion that excessive loss of vitreous may predispose to detachment of the retina is as erroneous as it is theoretically bad, for it is generally assumed in such cases that the vitreous collapses, and, therefore, that the retina must be dragged away from the choroid. But in order to bring about this state of things, the vitreous would have first of all to be attached to the retina. I have seen several cases of detachment of the retina in aphakial eyes, which had been operated upon without removal of the capsule, as well as without loss of vitreous. On the other hand, I have never yet seen a case of detachment of the retina after extraction with the capsule, accompanied with loss of vitreous. This observation, in a negative point of view, is worth more to me than all the theoretical objections raised against our method. Never-

theless, it does not prevent an eye in which extraction with the capsule has been performed from being affected with a detachment of the retina.

I will now briefly sum up the advantages of our operation when compared with other methods:

1. We gain a perfectly clear pupil.

2. Iritis, especially plastic as well as recurrent iritis, with all its consequences, is never observed. This fact throws great light on the causation of iritis after all cataract extractions. In my opinion, the cortical portions of the lens excite iritis by their mechanical, chemical, and, possibly, their septic action. The retrogressive metamorphosis in the lens during the formation of cataract frequently begins with the formation of the fatty acids, cholesterine, margarine, which, acting directly upon the tissue of the iris, may cause it to become irritated, or even inflamed. I have already suggested and tried to gain a foundation for this view in my brochure, and Knapp might equally well have used the same in favor of his method of peripheral capsulotomy. My experience teaches me that cataracts which mature rapidly have less general tendency to result in iritis after extraction without the capsule than old, hypermature, or slowly ripening cataracts. Moreover, the disposition to produce iritis in a few cases is not to be referred so much to the amount of the cortex left behind as it is to its chemical composition and direct action upon the posterior surface of the iris.

3. There is no danger that vision which has once been regained will again decrease from secondary opacity of the capsule, as happens so frequently after the usual methods, nor is there any need of the secondary operations which are so disagreeable to the patient as well as the operator.

4. We gain the greatest amount of vision; perfect, and even more than perfect, vision in 24 per cent. of the cases can hardly be noted after any other method. The partial successes are reduced to a minimum.

5. Hemorrhages, especially recurrent hemorrhages, are much less frequently observed.

6. Symptoms of dazzling (so often noticed after other methods), which are due partly to a slight irritation of the

iris, and partly to the diffusion of light through the remaining capsule, are less frequent during recovery, and at a late stage are never observed.

7. The capsule cannot, of course, become incarcerated in the cicatrix.

8. Even in eyes with severe complications we gain relatively the best vision.

The disadvantages of our method can be reduced to the following:

1. In some cases it takes slightly longer for the incision to heal.

2. Opacities of the vitreous are more frequent, but our statistics will give the best proof of their relations to the vision regained.

3. Astigmatism is, on the average, somewhat higher than in extraction without the capsule.

I do not regard the loss of vitreous during the operation as a disadvantage, nor should any one object to the greater technical difficulties of the operation. All our losses after this method have been due to panophthalmitis or iridocyclitis suppurativa. In the years 1878–1880, when we used the antiseptic method most scrupulously in 67 cases, we had but one iridocyclitis suppurativa, and not a single case of panophthalmitis. It would be foolish to find fault with the antiseptic method because one or two suppurations have been observed after its use, for there are sources of error in every operation, and it is difficult in ophthalmic surgery to exclude all septic infection that originates from the nose. Nevertheless, we should consider it as a great advance that during the use of antiseptics the number of suppurations should have decreased year by year. My own observations have proved this fact to me, and are sufficient to induce me to cling to the antiseptic method in the future.

The following statistics show all our *extractions with the capsule* from January, 1876, to August, 1880.* About two-thirds of the operations were performed by my late brother, the remainder by myself. The figures are purposely arranged year by year, and a brief résumé will follow:

* The whole number of operations during this period was 396; hence the capsular extractions amounted to nearly 30 per cent. of the whole.

1876, 30 extractions. The capsule burst in one uncomplicated case, but recovery was normal, and by a subsequent discission S $\frac{20}{30}$ was gained. Of the remaining 29, 24 were, on the whole, uncomplicated; 5 had complications which interfered with the final success or the course of recovery. All of the extractions were done with the spoon; loss of vitreous in 15 cases—13 in the uncomplicated and 2 in the complicated cases. The result in the uncomplicated cases was S $\frac{20}{30}$ in 4 cases, to $\frac{20}{40}$ in 10, to $\frac{20}{70}$ in 9, S = 0 in 1 case (suppuration of the incision ending in phthisis anterior).

The complications were:

1. Posterior synechiæ and limitation of F upward; no loss of vitreous; chronic iridocyclitis during recovery; quantitative perception of light.

2. Dense macula corneæ; amaurosis of the other eye; moderate loss of vitreous; recovery normal; and S as before the operation.

3. Iridocyclitis chronica with quantitative perception of light. Iridocyclitis during recovery. S as before the operation.

4. Posterior synechiæ; slight loss of vitreous; recovery normal; S $\frac{20}{40}$.

1877. 20 extractions: 18 uncomplicated, 2 extensively complicated before the operation. The spoon was used in every case, with loss of vitreous 14 times, viz., 12 in the uncomplicated, and 2 in the complicated. In the 18 uncomplicated cases the final result was S $\frac{20}{30}$ in 5; S $\frac{20}{40}$ in 9; S $\frac{20}{200}$ in 3; S=0 in one case of panophthalmitis.

The complications were, one case of dense leucoma corneæ; recovery normal, fingers counted at 2′; and one case of detachment of the retina, fingers at 1½′.

In all 5 cases with S $\frac{20}{30}$, there was a loss of vitreous.

The condition of the vitreous at the time of discharge was as follows: In 13 of the 18 uncomplicated cases there were no opacities, or those present were so slight that they did not disturb vision. In 4 other cases there were moderate opacities to which we might attribute a slight diminution of vision at the time of discharge. In one of the two complicated cases the vitreous was quite clear; in the other we have no notes on this point.

1878. 11 extractions, in 2 of which the capsule burst and vitreous was lost. The recovery in both cases was normal, with S $\frac{20}{30}$ in one, and $\frac{20}{60}$ in the other.

Of the other 9 cases, 7 were uncomplicated, 2 complicated. The extraction was done in all with the spoon. Vitreous lost in all the uncomplicated cases, and four times in the 2 complicated cases.

S, in the uncomplicated cases, $\frac{20}{30}$ in 2, $\frac{20}{40}$ in 1, $\frac{10}{30}$ in 1, $\frac{10}{200}$ in 2, and one counted fingers at 4′ (in consequence of chronic iridocyclitis).

The complications were as follows: In one case the chalky lens was dislocated into the anterior chamber, and from thence extracted. (This case really does not belong here.) In the other, dense corneal opacities. S $\frac{10}{200}$.

The vitreous was substantially clear in 6 cases; very turbid in 1. In the complicated cases we have no notes on this point.

1879. 31 extractions: in one the capsule burst. A part of the anterior capsule, with adherent cortex, remained behind, and was followed by iritis, which led to the formation of a thin false membrane in the centre of the pupil. The patient counts fingers at 2 *m*; Iridectomy or discission may be done at a later date.

Of the other 30 cases, 23 were, on the whole, uncomplicated; 7 complicated so much as to prejudice success as well as the course of recovery. Twenty-eight of the extractions were done with the spoon; in two, simple pushing sufficed to remove the lens. There was a very slight loss of vitreous in 18 cases, 13 of which were uncomplicated, 5 complicated. The result of 23 uncomplicated cases was: S $\frac{20}{30}$ in 7, to $\frac{20}{40}$ in 9, to $\frac{20}{200}$ in 6; S=0 in 1. (Iridocyclitis suppurativa.)

The complications consisted in one case each of excessive myopia, posterior staphyloma, and opacities of the vitreous. In the other eye, M=$\frac{1}{\infty}$, and opacities of the vitreous, S$\frac{6}{18}$.

Dense corneal opacities; fingers at 7 *m*. (The other eye was phthisical from an extraction done elsewhere.)

Posterior synechiæ, artificial coloboma, perception of light lost downward (detachment of the retina). Prognosis unfavorable, and an operation done only at the urgent request of the patient. Chronic cyclitis; S=0; failure.

Dense corneal opacities; fingers at 4 *m*.

Posterior synechiæ; vitreous opacities; fingers at 2 *m*.

Irido-choroiditis sympathetica after a thrust from a cow's horn in the other eye. Projection uncertain; diminished perception of light; fingers at 1½ *m*.

Amblyopia; strabismus divergens; uncertain projection; S $\frac{5}{60}$.

The condition of the vitreous at the time of discharge was as follows: of the 23 uncomplicated cases, 18 had no opacities at all, or none to prejudice vision; in 4 vision was decidedly diminished by the opacities; and one case was lost by purulent iridocyclitis, although the globe did not subsequently shrivel.

Of the 7 complicated cases, three showed vitreous opacities: in one the media were clear; in the others nothing accurate could be noted.

As regards the relation of loss of vitreous to the amount of vision regained, we merely note that in 7 cases which recovered perfect vision there were 4 cases of loss of vitreous.

1880 (to the end of July). 25 extractions: 6 decidedly complicated; 19 on the whole uncomplicated. The spoon was used in all. Vitreous was lost in 7 uncomplicated cases and in 2 complicated.

Vision in the 19 uncomplicated cases was: S $\frac{20}{30}$ in 10, to $\frac{20}{40}$ in 8, $\frac{20}{70}$ in 1.

The complications consisted in three cases, of chronic irido-choroiditis, with closure of the pupil, in two of which iridectomy had previously been done, and in all of which there were pronounced vitreous opacities before the operation. S in one case $\frac{10}{30}$; in one $\frac{10}{70}$; in one, fingers at 6 *m* (cannot read). In all of these cases the lens was removed with extraordinary ease, without loss of vitreous. In two cases (double cataract) chronic choroiditis, with atrophy of the retina; in the right eye only a small outer portion of F had been preserved. S after the operation, fingers in the outer portion of F; left eye, good perception of light; S $\frac{10}{40}$ after the operation; well-defined vitreous opacities.

Amongst further complications we noted one case of

episcleritis, sclerosing keratitis, and well-marked corneal opacity, in which iridectomy had previously been twice performed. S $\frac{6}{60}$ after the operation.

In the ten cases of perfect vision after the operation, there were four of greater or less loss of vitreous.

In the 117 cases of extraction by our method, the capsule burst four times during the operation; but we gained S $\frac{20}{30}$ in one case, $\frac{20}{30}$ in one, fingers at 2 *m.* in one, while in the fourth the pupil became occluded; but a secondary operation will probably restore useful vision. Of the remaining 113 cases, 91 were uncomplicated; 22 considerably complicated. In the 91 uncomplicated cases, 28 recovered perfect vision, although 16 lost vitreous during the operation, an observation which shows how little tendency there is in the loss of vitreous to lead to dense opacities of the vitreous which may obscure vision, and how little it complicates the course of recovery.

To recapitulate the results of 117 cases of extraction in the capsule: S—$\frac{20}{30}$ (or better) in 28 cases; between $\frac{20}{30}$ and $\frac{20}{40}$ in 37 cases; between $\frac{20}{40}$ and $\frac{20}{200}$ in 20 cases; $\frac{10}{200}$ in 2; and fingers at 4′ in one case. In three cases, S—0 (quantitative perception of light and amaurosis), one of them being total loss of the eye by panophthalmitis.

I hope that this paper may succeed in introducing more and more into practical ophthalmology an operation which my brother cultivated with so much ardor and perseverance during a period of fifteen years; an operation which has now been tested in 533 cases, and with which, in later years, we have gained such excellent results. As for myself, I propose, so long as I live, to operate by this method in those cases in which it is especially indicated, and I shall continue to publish, from time to time, a full account of the results which I may gain.

CLINICAL CONTRIBUTIONS.

By Dr. E. L. HOLMES, of Chicago.

I.—*A case of Aneurismal Tumor of the Orbit.*

Mrs. H., 40 years of age, married and mother of five children, had suffered many years with facial neuralgia and indigestion. From a peculiar diathesis, slight contusions on any portion of the integument caused extensive ecchymoses, although cuts and scratches were not attended with unusual hemorrhage. She was habitually pale and weak, but not emaciated.

On an afternoon in January, 1878, while quietly conversing with friends, without the slightest warning or apparent cause she was attacked with a most sudden and violent pain in the left orbit. This was at once followed by an enormous exophthalmus, swelling of the lids and cheek, together with a pulsating sound, which the patient referred to the orbit and head. Her physician, Prof. J. H. Etheridge, 22 hours after the attack, found the patient nearly exhausted from pain and shock. The globe protruded between the distended lids, and was motionless and blind.

Auscultation and palpation revealed the sound and impulse peculiar to aneurism. On account of extreme prostration, it was thought advisable simply to relieve pain by opiates, and to revive strength by nutritives. It was hoped the symptoms might possibly be relieved spontaneously.

At the end of two weeks I was requested by Dr. Etheridge to visit the patient with him. There were increased redness and œdema of the greatly-exposed ocular conjunctiva. The cornea had lost its sensitiveness, was only kept moist by artificial means, and showed signs of speedy and complete necrosis. The pupil, scarcely visible, was moderately dilated. The condition of the lens, vitreous, and fundus, could not be determined. The pulse

was frequent and weak. No abnormal condition of the heart and arteries had been detected.

I had observed, in my own experience, one case of orbital aneurism terminate favorably after the internal use of veratrum viride and ergot, and another after the use for persulphate of iron injected into the sac. I did not, however, regard the condition of this patient as favorable for these remedies, but urged counsel with an experienced surgeon regarding the propriety of ligating the carotid artery.

For the subsequent history of the case I am indebted to Prof. Etheridge.

It was deemed best, in consultation with Prof. M. Gunn, to ligate the carotid.

After a necessary delay of two days, however, the aneurismal symptoms diminished. After a further delay of two weeks the sounds had spontaneously ceased, with great decrease of the swelling and pain. At the end of 60 days after the attack, the lids rested partially closed over an atrophied globe.

In the third week it had first been observed that the left side of the face was paralyzed. From this time also peculiar râles in the left side of the chest, together with a most violent cough, continued through life. The paralysis never disappeared. A permanent red line in the skin extended from the supra-orbital notch perpendicularly over the forehead into the scalp.

The general health, in spite of the cough, gradually became as good as usual. In fact, for several months it was remarkably good.

On December 4, 1880, Mrs. H. died suddenly at the breakfast-table, without the slighest premonition. After death, blood in considerable quantities flowed from the mouth, nostrils, and ears, especially the left one. The veins of the neck were engorged to a remarkable degree. No autopsy was permitted.

II.—*A Case of Persistent Hyaloid Canal.*

E. J. W., aged 17 years, born in England of German parentage, had always suffered from a great degree of amblyopia in the right eye.

He consulted me at the Illinois Charitable Eye and Ear Infirmary to determine whether a recent slight improvement of vision, which he thought he had observed, could be increased. I found a marked divergent strabismus and an iris very much darker than

that of the other eye. This peculiar coloration, the patient stated, was congenital. The pupil was sluggish in alternate shade and light, and only dilatable moderately by atropine. The patient experienced quite a large central defect in the field of vision. In the peripheral portion V. was scarcely 5:100.

An examination of the vitreous revealed a remarkable white object, resembling in shape a wine bottle, with its base on the optic disc, and its body, neck, and head reaching forward almost to the centre of the posterior capsule of the lens.

I had never seen a cysticercus in any tissue of the eye. From the close resemblance of the "head" of this object to that of the cysticercus, I at once concluded that I was witnessing this parasite for the first time. As, however, in this case, there was no motion of the object, and as there had never been the slightest irritation or pain in the eye, I finally decided that there was a persistent hyaloid canal with brilliant white walls, which might contain fluid. The base was somewhat larger than the optic disc, covering its entire periphery.

Expecting another interview with the patient, I spent all available time in watching for possible movements of the object just described. For this reason I did not examine other intra-ocular tissues, nor test the refraction or the color-perception. The patient did not return for a further examination.

III.—*A Case of Traumatic Aniridia.*

On March 15, 1881, Mr. ——, 53 years of age, consulted me regarding his left eye, which he had been told, was in danger of blindness from sympathetic inflammation. Two months previous the patient first observed a sudden and quite extensive central scotoma. There had been no pain, nor at any time any objective symptoms. The ophthalmoscope revealed large extravasations of blood in the retina at the temporal side of the disc.

No traces of the iris remained in the other eye. Three or four millimetres from the inner border of the cornea was a dark oval cicatrix of the conjunctiva, two or three millimetres in diameter. The patient stated that two years before, he had received a severe blow on the right side of the face and eye, from the recoil of an iron lever. After the first shock all pain soon ceased. In three weeks the eye was free from inflammation.

Although the corneal border was undoubtedly the seat of the rupture, through which the iris was forced, no cicatricial tissue in-

dicated its precise position or its extent. As the eye had been perfectly quiescent and free from tenderness for two years, I could not associate the disease of the left eye with the injury of the right. The vitreous was cloudy and contained floating bodies. The disc and portions of the sclerotic were dimly perceived —the latter through the atrophied choroid.

With a proper direction of the light from the mirror, a clear dark-red ring could be seen enclosing a black ring—the periphery of the lens—within which was the ordinary red reflex as observed in a pupil greatly dilated. The ciliary processes were not visible as regular elevations, but simply as a dark ridge just behind the border of the cornea.

Changes in the form of the lens and of the ciliary processes could not be discerned during efforts of accommodation. There was no trembling of the lens. Probably the inelasticity of the lens and atrophy of the ciliary muscular fibres rendered such changes impossible. Vision was most distinct with $+\frac{1}{18}$. With this V. was $\frac{3}{60}$.

AMYLOID DEGENERATION OF THE CONJUNCTIVA.

By Prof. E. RAEHLMANN, of Dorpat.

(*Table V, figs.* 1–7.)

Translated by William C. Ayres, M. D.

I.—*Report of cases of so-called amyloid tumors.*

Case 1.—E. S., a woman, 36 years old, of medium stature, good general health, presented herself to me October 31, 1879, on account of a tumor of the left eye, which had commenced about two years before, and since had slowly but continually increased in size. A few months before she came, it had produced some impediment to the movements of the eye, and had also caused loss of sight.

She was of a healthy family; had healthy brothers and sisters; and had, herself, never been seriously ill. An examination of her general system revealed nothing of importance, except a swelling of lymph-glands in the axilla and inguinal region, somewhat greater on the left than on the right side.

On examination the left eye showed a prominence of both lids, especially the upper, which stood out considerably from the frontal plane, so that its outer surface, when measured from the inner to the outer canthus, was 6½ *cm.* long. On palpation a knotty mass could be felt in the depth of the tissue, which was hard in places. The skin was movable over the hard nodules, and could be elevated in folds, showing no inflammatory reaction. The canthi were also free from inflammation. The patient could open the palpebral fissure only slightly, but when the upper lid was elevated, a prominent tumor-mass was seen, which had the appear-

ance of a distended sac. It projected over the inner sclero-corneal margin, reaching as far as the middle of the cornea. To the outer side it extended only to the margin, whereas, above and below, it had not reached quite so far. In the region of the cornea it was about 5–6 *mm.* thick, so that to the temporal side, where the cornea could be seen, it appeared as if it were situated at the bottom of an excavation. A probe could be passed under the overhanging lobules of the tumor, when it could be raised up from the cornea. The surface of the tumor was of a yellowish-red, or brown color, was hard, and had a peculiar diaphanous aspect. It was perfectly smooth, dry, and shining, and without secretion.

Eversion of the upper lid was impossible on account of the tightness of the tissue. Carefully pulling the under lid downward, it could be seen that the tumor had its origin from the region of the plica semilun., with a broad base, which became narrower outward, as it extended along the fornix of the under lid. The mass continually diminished in thickness, as it passed toward the cornea and canthus; and that part of the tumor which corresponded to the under lid, had a yellow, waxy appearance. The surface was smooth, but when the lid was drawn away from it, we could notice small grooves in the tissue, of various sizes and shapes, which showed a lardaceous condition in their depths, which bled slightly when exposed.

On examination, the surface of the cornea was slightly but diffusely cloudy. Humor aqueous, lens and vitreous transparent. Ophthalmoscopic appearance normal, especially the blood-vessels of the retina. Field of vision and color perception normal. $S=\frac{2}{3}$.

The right eye was normal, showing no irritation of the conjunctiva, with the exception that it had a peculiar light transparent color along its whole lower fornix. On November 25, 1879, I narcotized the patient, and endeavored to remove the greater mass of the tumor, and in order to expose it in its entire extent, the outer canthus was cut as far as possible, and the upper lid everted. As soon as this was accomplished, a part of the growth sprang out from the region of the upper fornix, in the shape of tightly stretched tumor mass. When the under lid was also drawn down, the topography was more easily recognized. The tumor originated as a closed ring, with a broad base, in the fornix above and below, in the plica, caruncle, and conjunctiva of

the outer canthus. At the latter place the ring was thinnest, being thickest and largest at the inner canthus, and at the upper fornix. The mass which extended from the upper fornix could be slightly raised with a probe, was hard to the touch, encroaching upon the cornea in the shape of several large lobes. The whole ring had a smooth surface. The free mucous membrane of the upper lid (a small portion next to the lid-margin) showed a slight congestion and swelling of its tissue. In no place were there granulations or cicatrices.

The largest part of the tumor, near the plica, was first abscised; then a piece about the size of a pea was removed from the under lid; and, lastly, a portion almost as large as a walnut was cut away from the upper lid with scissors and knife. After this, parts which still protruded were removed with a sharp spoon.

The hemorrhage was small during the whole operation, although the tissue was full of cavities, and was often pulled off in thick lumps by the spoon.

After replacing the upper lid, the conjunctival sac was carefully cleansed, and washed out with a one-fourth per cent. solution of carbolic acid; the wound closed at the outer canthus by sutures. Bandaged with carbolic lint and salicylic wadding, which was changed several times daily.

The day after the operation the lids were slightly swollen, which increased from day to day for a short time, and a sero-mucous secretion was copiously discharged. On November 28th, three days after the operation, the lids were very much swollen, the cornea diffusely opaque and rough, the patient complaining of severe headache. Her general condition was good with this exception, being entirely free from fever.

Nov. 30th.—Profuse muco-purulent discharge; the cornea more opaque, showing a superficial loss of substance in the region of the pupil.

Dec. 2d.—Reaction generally less, the swelling of the lids, the secretion, and the corneal opacity having diminished; in the centre of the cornea, however, was a shallow ulcer. The conjunctiva which was left showed a lardaceous condition; it was, however, smoother, and had lost its previous brittleness.

Dec. 8th—The lid-swelling disappeared; corneal ulcer healed, and the conjunctival wound closed by new cicatricial tissue. The patient could raise the upper lid considerably.

She was discharged on Dec. 18th, when there was a strong cica-

tricial band surrounding the cornea; no hard tissue was to be felt; slight ptosis of the upper lid. Central corneal opacity slightly vascular; patient counted fingers at 15 feet.

On April 15th, or six months after the operation, she reappeared with the following conditions. Left: Position of the canthi, cilia, and puncta lacr. normal. Decided ptosis of the upper lid, extending to the superior corneal margin. When the lids were everted, bands of connective tissue were seen to be put upon the stretch, lying especially in the inferior fornix, and at the inner canthus. Where the conjunctiva is preserved, it is slightly thickened, congested, soft, and smooth. In the superior fornix is a flat cicatrix, about 3 *mm.* broad, which is narrower toward the inner and outer canthi, passing down to the inferior fornix. Superficial corneal speck; iris movable. $S=\frac{1}{10}$. The right eye remains normal, except the fornix of the under lid, where there is a transparent brownish-yellow discoloration, including a region of about 3 *mm.* in breadth.

The histological examination and chemical reaction in the excised tumor gave the characteristics of the so-called amyloid degeneration of the conjunctiva. The case is, however, interesting for two reasons: first, because, according to the description, there was no complication with trachoma; and secondly, as it showed the beginning of the process, which has not been studied up to the present time.

Case 2.—April 5, 1880. L. P., a fisherman, aged 30, came from a healthy family, was never seriously ill, referred his eye disease to a cold, which he contracted five weeks ago, during a sea voyage. Since that time, he says, a tumor has been steadily developing in his right eye. In both eyes vision, accommodation, and field of vision normal.

The patient is robust and of average stature. On examination his maxillary and cervical glands are considerably swollen on the right side. Left, normal. Functions of the different organs of the body undisturbed.

Pityriasis versicolor of the skin of the chest and back. The left eyelids and conjunctiva normal. Right: the skin of the upper and lower lids slighty congested, especially at the outer canthus, where it was somewhat swollen. On palpation the swelling was hard to the touch. When the palpebral fissure was opened by depressing the under lid, a tumor was seen in the conjunctival sac

over the whole extent of the conjunctiva bulbi. It was closely attached to the eyeball, extending on the one side precisely to the cornea ; on the other, no further than the fornix. With the exception of the region of the outer canthus, the conjunctiva palpebrarum was not implicated, its surface, perfectly smooth, being only affected with a slight catarrh. *The tumor surrounded the cornea in the shape of a steep ridge.* The height of this ridge was 5–6 *mm* on the outer, and 3 *mm.* on the inner side of the cornea. The tumor was more strongly developed at the outer canthus, and diminished gradually as it passed toward the medial side of the eye.

The surface of the tumor was perfectly smooth and even, of a yellowish-brown or brownish-red color, and of what might be called a soft consistency.

On April 8th I removed a piece of the tumor from the outer canthus, about half the size of a walnut. The outer canthus was then divided, and the palpebral fissure opened by everting the upper and depressing the under lid. The latter had smooth edges, but showed a lardaceous reflex and consistency, having a diaphanous aspect. The cut in the lid passed through that part which was hard on palpation, and a portion of the skin was removed for histological examination.

When the lids were opened, it could be easily seen that the conjunctival tumor was connected with the thickened skin in the entire region of the outer canthus. The portion of the tumor which was extirpated had reached from the corneal margin to the external canthus, and was 1½ *cm.* in breadth.

The lateral incision made to detach the tumor from the conjunctiva diverged from the corneal margin to the fornices, and the included tumor-mass was dissected off with the scissors, down to the surface of the sclera. Near the outer canthus it had a thickness of 7 *mm.*

The wound at the outer canthus was closed by sutures. The conjunctival sac washed out with a solution of carbolic acid ; and the eye dressed with disinfected bandages, which were changed several times daily.

Healing took place in the usual manner, on the second day after the operation, the whole being covered by a muco-purulent secretion ; slight swelling of the parts ; cornea perfectly clear. April 15th, luxuriant granulations, and slight swelling. The patient could not be persuaded to remain in the clinic any longer, and left off treatment.

He presented himself on May 20, 1880, when his condition was astonishing. The tumor had not been removed from at least two-thirds of his conjunctiva, but what had been left had entirely disappeared, leaving only a slight swelling in the superior inner quadrant of the conjunctiva. At the outer canthus, where the tumor had been cut away, we find strings of cicatricial tissue stretching to the outer corneal margin, which somewhat impede the motions of the globe. The cornea was perfectly transparent; the conjunctiva slightly injected, of normal color, and without swelling or secretion. The skin of the lid slightly thickened in the ciliary region of the outer canthus, the thickened part, however, having a soft feel.

The right eye was functionally normal, except the slight impediment to motion internally. Left eye normal in every respect.

The tumor showed, both clinically and histologically, the reaction of amyloid degeneration.

Remarks.—Both of these cases are important from a clinical standpoint, because they show amyloid degeneration of the conjunctiva without complication with trachoma. The first cases of amyloid which were published by Oettinger and Kyber were complicated with it, as were also those of v. Becker, Mandelstamm, and Bogowitsch; while Ströhmberg and Sæmisch hold that it is independent of this disease.

Mooren, in his extensive clinical experience, was also unable to assign it to trachoma, whereas the case of Reymond shows evidently that amyloid degeneration can happen as a circumscribed affection in a conjunctiva which is otherwise perfectly healthy. My two cases are analogous to that of Reymond, in that the tumors were amyloid and confined to the conjunctiva bulbi, with the exception that the tissue in the region of the outer canthus was also implicated. Besides this the conjunctiva was normal, except a slight catarrh, with no symptoms of trachoma.

In the first case published by myself, trachoma must also be excluded, and in it, too, the disease was confined to one eye.

The course of these two cases is interesting, since they show the possibility of amyloid degeneration subsiding after

only a partial abscision of the growth. Authors on the subject were heretofore of the opinion that the disease was only to be cured by a radical extirpation, or otherwise the tumor would certainly return. Only a few (as Oettingen, Zwingmann, ond others) considered it as a retrograde metamorphosis, but even they were also inclined to believe in radical extirpation, since in several cases where this had not been practised there were unmistakable relapses. V. Hippel was able to cure a case, which he had watched for a long time, only after two relapses of the process. Leber thinks that a spontaneous cure is impossible, which according to my experience is questionable; but it is of great importance, as far as the indications of an operation and the prognosis are concerned, to know that it is possible to do away with the disease by a partial extirpation of the tumor. In my cases, as already remarked, the tumors were both of recent date, or even presented the beginning of amyloid degeneration; but, nevertheless, the growths were as large as any which have come under observation. The possibility or the necessity of return may depend upon the age of the tumor, or upon the extent of the degeneration; but to settle this point definitely, farther clinical experience seems to be demanded.*

All authors agree that amyloid degeneration of the conjunctiva is to be considered as a localized affection, a fact which practitioners of medicine have not conceded in amyloid degenerations of other parts of the body.

Ströhmberg has reported a case in which there was suppuration of the glands of the neck. I must also remark, in this connection, that in both of my cases there was considerable swelling of the lymph-glands of the neck, especially on the same side as the affected eye, but without drawing the conclusion that the one was the cause of the other.

II.—*The histological structure of the tumors.*

The tumors of the conjunctiva already described have received the name amyloid, because those extirpated by

* The question of the clinical position of these tumors, will be discussed by Dr. Kubly, clinical assistant, in a forthcoming communication of a case which came under my observation after finishing this article.

Oettinger were shown by Kyber and Böttcher to be of an amyloid nature. Since then all other authors have considered them as being of this nature, and looked upon the amyloid portions as the principal factors in the disease. It is remarkable that the histological structure of the tumor has received but little attention, that part of the tumor which surrounds the amyloid having been considered simply a part of the tumor which enclosed the degenerated mass. It is possible, however, that the reason of this is to be found in the fact the authors had not the requisite material to study the origin of the process from a histological standpoint.

Even the recent work of Leber, which gives us an entirely new idea as to the origin of amyloid, discussed in the most minute particulars the origin of the degenerated mass without taking into consideration the source from which the preëxisting tissue, which furnishes the amyloid, has its origin. He has failed to describe the initiatory stages which result in the formation of the first amyloid bodies; this is especially astonishing since it is precisely these first stages which are requisite to the complete understanding of the entire pathological process.

The first description of tumors of this kind came from the clinic at Dorpat, and within the last ten years five new cases have been added to the list. The same material which furnished the articles of v. Oettinger, Kyber, Ströhmberg, and Zwingmann is still at my disposal, and in a well-preserved condition, so that when I add to them the cases which I myself have observed during the last ten months, I am in possession of a comparatively large collection.

Below will be found the record of several cases which have been observed during this time, which present, without doubt, the beginning of the disease, both as to clinical observation and histological examination.

From the beginning I have undertaken to study the clinical course and the histological structure of these tumor formations, disregarding the amyloid condition, and have come to the conclusion that *the formation of amyloid in the conjunctiva is always preceded by a hyaline degeneration;*

that the formation of amyloid bodies in a tumor is always to be looked upon as accidental, occurring only in advanced stages of the tumor, and even then being a secondary production; lastly, that these tumors are entirely independent of trachoma.

Before going into the finer structure of the tumors, I would like to make a few remarks as to their macroscopic appearance.

In the foregoing description it is stated that the surface of these tumors is perfectly even and smooth, having sometimes a pale-red color in places; besides this, they have always a pale-yellow and a peculiar diaphanous or succulent aspect. Irregularities in the conjunctiva never occur except where the developing mass produces folds in it, and in particular we never find small granules which could be taken for trachoma. In the second case of L. P., the surface of the tumor was here and there studded with small yellow specks, which gave the surface of the swollen conjunctiva bulbi a dotted appearance, but the small bodies which brought about this condition were nowhere prominent, were within the tissue, and always of the same level as the mucous membrane.

Cases often occur in which this condition obtains, where the conjunctiva is the same in color, smooth in surface, presenting a diaphanous appearance, without any tumor formation. Generally it is not a question of swelling of the conjunctiva "in toto," but more of a hypertrophy of the fornix, which commences in the shape of larger or smaller reduplications, with a broad basis at the fornix, and extending as a sharp ridge between the conjunctiva of the lids and the bulbus.

Frequently the swelling starts from the plica semilunaris or caruncle and extends like a third eyelid or membrana nictitans. In such cases, when the lower lid is depressed, we find that the swelling passes along the fornices, and loses itself in the tissue in this locality. In South Germany I have never observed this condition, while in the eastern Russian provinces it is of frequent occurrence.

These circumscribed swellings are not to be confounded

with the hypertrophied conditions which are often observed in trachoma, which were first described by v. Ammon, and lately by Stellwag (*Lehrbuch der Augenheilk.*, 1870, p. 453). The diaphanous, lardaceous aspect is of itself sufficient to distinguish it, independent of the fact that the surrounding conjunctiva is free from all trachomatous formations. It is much more easily to be recognized when the conjunctiva is greatly swollen, where the swellings originate in the fornices, plica, or caruncle, and attain larger dimensions.

Case 3.—Anna P., æt. 31, came from a healthy family, and was herself in good health with the exception of the condition of her eyes. The right eye was normal in every respect. In the left, the lids and their margins were normal, and the puncta lacrym. in their proper positions. The lid conjunctiva had a peculiar whitish-yellow and shining appearance. The surface was smooth, and without visible blood-vessels. The caruncle was slightly red, but otherwise normal. A fold from the conjunctiva of the outer canthus extended between the globe and the lid in the shape of a ridge 2–3 *mm.* in height, and gradually becoming smaller, until it lost itself at about the middle of the fornix of the under lid. This ridge had a pale-yellow, lardaceous color; its consistency was soft. A small portion was cut off for histological examination. The diseased eye was functionally normal.

Case 4.—John H. æt. 40, a strong, healthy man, whose right eye was normal. The conjunctiva of the under lid was swollen, red, and slightly folded. Several cicatrices were found in the conjunctiva of the upper lid. There was a tumor which sprang from the caruncle and extended along the fornix to the middle of the under lid, which was plainly brought to view by ectropionizing. It was hard, had a smooth surface, and was of a glassy, yellow color. A small piece was cut away from its centre.

Case 5.—A fifth case has been published by Zwingmann (Inaug. Dissert., Dorpat, 1879, page 150). It was of a polypoid nature, about half the size of a walnut, situated in the region of the caruncle and plica semilunaris, including the lower fornix. Its surface was smooth, brownish-red, but no diaphanous appearance could be noticed. The consistency was soft and elastic. A piece of this tumor was cut off and preserved in alcohol.

The histological examination of the three latter cases, and especially of Case 5, gave a structure which coincided precisely with the initiatory changes in the subepithelial tissue of those tumors which have been denominated amyloid degenerations.

When thin sections were made through the abscised portions perpendicular to the epithelial covering, we could recognize, by high magnifying power, that the epithelial tissue was normal (fig, 1), and that the basilar membrane was sharply defined except a slight unevenness of its surface. Beneath the epithelial tissue I found accumulations of cells which extended deep into the tissue, lying so close together that only here and there a supporting tissue could be recognized.

In preparations made by shaking in a test tube, this tissue appears as a fine network, with cells at the nodal points of its meshes. The larger cell-masses were composed of lymphoid bodies, which filled the meshes of the supporting membrane, and were sharply defined from the deeper subconjunctival tissue of the fornices. The tissue has, therefore, the usual structure of an adenoid growth, as we sometimes find it in the normal conjunctiva. It differs from the normal condition principally in extent, was transformed more or less into the nature of loose conjunctival tissue, and was swollen to from 4 to 6 times its natural thickness. There was likewise an increase in the number of cells in the framework, and, finally, these cells also showed characteristic changes. In different parts of the tumor they were remarkably transparent, so that their contours and nuclei were seen with difficulty; and while the normal cells in the conjunctiva were easily colored with carmine, these were but slightly tinted with this reagent; even then the staining was easily washed out with water. Only those preparations which had been preserved in Müller's fluid could be colored deeply, and when so stained were still less colored than normal tissue, and retained their transparent aspect.

The parts in which these changes were most conspicuous always lay deep in the tissue. In Case 3 this was more pronounced than in any of the rest, and in this specimen the

cells which filled up the spaces in the supporting tissue were *clodded* together, and had a diaphanous appearance. In these accumulations the nuclei were very indistinct, and sometimes embedded in a homogeneous, glass-like ground-substance, in which they were invisible, unless treated with a solution of tannate of iron. These accumulations were situated mostly isolated in the tissue, not crowded together in clusters.

The tissue was remarkably free from blood-vessels, by which characteristic it could be distinguished from ordinary granulations, and even the small arteries showed a characteristic degeneration of their walls; viz., corresponding to the adventitia I found a very broad transparent homogeneous ring, in which no histological structure could be detected.

The tissue showed no reaction to iodine or sulphuric acid, with the exception that the transparent parts were colored light-brown by the iodine, which color was not changed by the addition of SO_3. Methyl violet colored the tissue blue. In Case 3 the walls of some of the vessels were tinted red in parts which corresponded to the adventitia. The whole evidently presented a tissue-metamorphosis analogous to what has been described by Recklinghausen as hyaline degeneration of lymph-glands; and when we consider that these changes are in an adenoid tissue which has a similar structure to that of lymphatic glands, we cannot doubt that the two processes are identical. In hyaline lymph-glands, Recklinghausen and Wieger have found precisely the same amorphous ring in the adventitia of the vessels, and the same homogeneous accumulations. By the kindness of Profs. Arnold and Thoma, in Heidelberg, I have also had the opportunity of examining specimens of hyaline degeneration of lymph-glands, which presented the same appearance as I find in my conjunctival tumors.

Even when these formations in the conjunctiva present no reaction of amyloid substance, nevertheless, from their histological development, I am inclined to consider them as stages in the formation of tumors which afterward will

give this reaction. This agrees with the opinion of Recklinghausen, who considers hyaline degeneration as a preliminary stage which will, later, give all the amyloid tests.

The largest tumors which I have extirpated showed this condition very plainly, viz., hyaline degeneration, with a circumscribed locality in its vicinity, in which were amyloid formations.

In the largest tumor, I found, both in longitudinal and cross sections, a thick layer of lymphoid cells beneath the epithelium within a supporting tissue, as I have already mentioned. In a large area this tissue did not color by carmine, neither the cells nor the framework, while circumscribed patches next to the epithelium were deeply colored by this reagent. In the uncolored parts I could see the forms of the large cells, but could not distinguish nuclei from protoplasm; and, in the immediate vicinity of this tissue, were masses made up exclusively of diaphanous and homogeneous elements in close apposition to one another. They were separated by transparent spaces, were most frequently conical or oval, but often also round or angular.

Where the homogeneous tissue bordered on the tissue containing masses of cells, the line of demarkation was not sharp, the two conditions gradually merging into one another. In the fornix I frequently found lumpy portions situated isolated or in clusters in the adenoid structure. We see this condition particularly well defined where the lumps have partially fallen out of the preparation (fig. 1, tab. v). In such places we find a delicate reticulum from the meshes of which the cell-groups have partially been removed, and in some of the meshes in such localities we observe a homogeneous mass, presenting a shining appearance, especially in preparations which have not been colored. On treatment with iodine and sulphuric acid, they sometimes assumed a dark mahogany-brown color and in other instances they were not colored by any reagents. They did not show any reaction characteristic of amyloid when treated with methyl-violet, only small portions, especially the walls of the blood-vessels, assuming a reddish hue. All other parts, both nodules and supporting tissue, were tinted

a diffuse blue; therefore, with the exception of the small portions referred to, there were no amyloid formations. Nevertheless, the histological structure of those parts which showed only a hyaline degeneration, were not to be distinguished from those which gave the most marked amyloid reactions.

If we place those sections which show the above-described condition in weak solutions of tannate of iron (I generally use a diluted solution of writing ink), the whole condition is different. The subepithelial cells are colored intensely black, the nuclei become distinct, and the cells and supporting tissue are plainly visible, probably on account of the contraction of the albuminous parts by the action of the ink. The diaphanous portions are colored a light-gray, as are also the nodular masses in the depth of the tissue. Between these we find a supporting net-work of cells, corresponding to the tissue which separated the hyaline nodules from one another in uncolored preparations. This net-work of cells is highly characteristic, being composed entirely of elongated cell-bodies, which anastomose with one another, forming a typical net-work tissue (fig. 2, tab. v). Its meshes are sometimes broad, sometimes narrow, and the gray structureless nodules are within them.

In preparations which have been hardened in chromic acid, or Müller's fluid, and not stained, we also see with high powers, thicker parts of this net-work; and in places where these homogeneous masses are not close together, we find the interspaces filled with large lymphoid bodies, but their contours and nuclei are indistinct.

In these preparations I found exactly the same conditions as described by Kyber, Ströhmberg, Zwingmann, and others in amyloid tumors which had been preserved in alcohol, with differences, of which the following are of importance, viz.: in the better-preserved portions of the preparations, the characteristics which they described are much more plainly to be seen; just beneath the epithelium of the conjunctiva there is a typical adenoid structure, which has but few blood-vessels; in it is either an increase in the number of cells, when the supporting tissue is more

or less hidden, or the supporting tissue is larger in places, when it is typical in character. In its interspaces we sometimes find lymph-cells, which are well colored, sometimes showing a hyaline degeneration. In different places the lumpy formations approach more and more to the outer surface, until they lie immediately below the epithelium (compare fig. 1, a).

The lumps which lie in the meshes of the adenoid tissue, or which spread themselves out into larger surfaces, are surrounded by a supporting tissue, which is of precisely the same structure as this tissue in lymphatic glands. This arrangement is frequently obtained by using tannate of iron, but more seldom by coloring with carmine.

Such tissue, when treated with iodine and sulphuric acid, gives a typical amyloid reaction. The homogeneous masses, which lie in the meshes, take on a deep-blue color, while the supporting tissue is not changed in the least. In this last tissue we find large spindle-shaped cells, which form a net-work by anastomosis in the older parts of the tumor (see figs. 2, 3).

In many places in the preparations, especially where the lumps are situated close to each other, separated only by their interspaces, we can also demonstrate a net-work tissue, by the use of tannate of iron, by which reagent the amyloid parts are colored deep-gray, and the rest of the tissue black. In such places the supporting tissue between the nodules is more fibrous, in which many nuclei become visible.

In such cases we therefore find an increase in cellular elements in the cell-nests, and also a new formation, resulting in an hypertrophy of the supporting tissue. Such pictures (fig. 4), with an increase in the number of nuclei in the supporting tissue enclosing amyloid masses, can be followed for greater distances in the preparation, extending toward the epithelial surface, and passing over into the ordinary adenoid tissue. We find also typical glandular tissue, extending toward the cartilage, sometimes touching it, containing lumpy formations and larger plaques of amyloid within its meshes (fig. 5).

The amyloid masses are surrounded by a capsule

made up of fine trabecles (fig. 5), which can be nothing else than the tissue of the vicinity which has been compressed by the amyloid masses, and from which the cells have fallen out in preparation.

In advanced cases the amyloid lumps are placed close together in uninterrupted rows, reaching to the tarsus, and between these we find the net-work tissue (fig. 3), composed of spindle-shaped cells, and a fibrous tissue, in which numerous nuclei are imbedded (fig. 6).

The spindle-cells, which form the net-work, and also the fibrous tissue, are not colored by carmine; and in these places we find transparent lines surrounding the amyloid masses.

The cells or nuclei appear after treatment with a diluted solution of tannate of iron, and present a condition represented in fig. 6. From the circumstance that the nature of this supporting tissue cannot be recognized by the use of most reagents, I am inclined to the opinion that no author has heretofore described this reticulum. In my own preparations, and in those which were made from the tumors described by Kyber and Zwingmann, it was absent only when the amyloid masses had disintegrated by the action of the preserving fluid; in this stage, however, we do not find a true tissue, but a mass of detritus.

In advanced stages of amyloid formation, we sometimes observe profuse hemorrhage in the tissue, so that all cavities are filled with red blood-corpuscles.

In the vicinity of such profuse hemorrhages, we frequently find extensive amyloid degeneration of the walls of the blood-vessels, which have bursted, bringing about the blood extravasation.

The transformation of the albumen in the normal tissue into amyloid masses seems to be connected with swelling or hypertrophy of tissue, which, when occurring in the neighborhood of diseased blood-vessels, causes a compression of their lumen, with a consequent rupture in their walls, in front of the constricted places.

The later stages in the formation of these tumors, in my opinion, are no longer of value in determining the nature

and structure of these growths; it is only the above-described net-work, made up of anastomosing cells, that can be considered characteristic of these changes in the conjunctiva. The tumors are formed from a connective tissue, which is analogous to the adenoid tissue in the normal conjunctiva, having a great similarity to the tissue of normal lymphatic glands. In the first stage there is simply a hypertrophy of the normal conjunctival tissue, whereas, later, there is a new formation which takes on an adenoid structure.

Large anastomosing spindle-shaped cells make their appearance in the subconjunctival tissue in the vicinity of the tarsus, containing collections of large lymph-cells in their intercellular spaces. In well-developed cases we find a typical fibrous net-work with numerous nuclei.

The tissue of the so-called amyloid tumors of the conjunctiva is the same in character as that of tumors of lymph-glands or lymphomata. I do not hesitate to state that these tumors are new formations *sui generis*, which occur in the conjunctiva and run their course independent of trachoma, and which can attain large dimensions, showing extensive hyaline formations without the occurrence of amyloid masses. The latter condition happens in the latest stages of the process as an accidental occurrence, just as it is found in tumors of other parts of the body, where it is looked upon as a transformation of the albuminoid constituents of the tissue where it occurs. Sometimes it is to be found in the cells of the adenoid structure, and sometimes in the lymph-cells in its meshes.

This view is opposed to the opinion of Eberth, but is in accord with that of Böttcher, v. Recklinghausen, and Leber. Whether the amyloid is directly produced from the bodies of the cells (Böttcher), or whether it is exuded from their surfaces (Leber, v. Recklinghausen), I could not determine from my preparations.

I have no doubt of the correctness of this view concerning the genesis of amyloid degeneration, since we so frequently see the regular blue amyloid plaques, always within an uncolored supporting tissue, in preparations colored with

iodine and sulphuric acid. At a later stage, or when we find an actual change in substance, we can also have this supporting tissue undergoing the same amyloid transformation, and also the tissue of the rest of the lid, cartilage, etc.

I have seldom found giant cells in the tissue of the tumors, and never in the immediate vicinity of an advanced degeneration, certainly never in such quantities as to support the opinion of Leber, who considers the formation of amyloid as due to the action of these cells. In only one preparation did I find them in considerable quantities, but just in this case there were neither lumps nor amyloid bodies.

The substance which surrounds the nuclei, as described by Leber, I consider the remains of the supporting tissue, which still holds the amyloid within its meshes. In teazed preparations it is easy to separate the meshes of the supporting tissue from the enclosed amyloid, or a portion of it remains attached to these masses (fig. 7, a), giving precisely the appearance described by Leber as envelopes which surround the nuclei of giant cells.

According to their histological conditions, adenoid tumors of the conjunctiva are entirely independent of the presence of trachomatous granules. In both of my cases there were no granulations, not even an unevenness of the conjunctival surface, and other authors have also observed the same condition. Therefore, the independence of such tumors must be conceded.

The fact that adenoid tumors may occur simultaneously with trachoma, or that such new formations may be met with in cases where the conjunctival surface is diseased, offers no obstacle to the acceptance of this view, since from this simultaneous occurrence we are not justified in considering them as dependent upon each other. The two processes have nothing in common but their origin, the adenoid tissue in the conjunctiva. The histological changes, and the pathological processes which produce both, are entirely different.

According to Berlin and Iwanow, in conjunctivitis granulosa, or trachoma, independent of a diffuse infiltration of

the conjunctival tissue, we find decided changes in its epithelium.

If this dipping in of epithelial folds and glandular formations, upon which these authors lay so much stress, are only to be distinguished by their size and shape from the same formations in the normal conjunctiva (Stieda, Sattler, Reich, J. Jacobson), they are nevertheless pathognomonic of trachoma, but they cannot be proven to be new formations. Such folds, cone-like projections, or off-shoots from the epithelium, do not occur of the same size and shape in the normal conjunctiva, nor do they happen in any other chronic inflammation of its tissue.

I agree with J. Jacobson, when he states, contrary to Wecker and Saemisch, that in the trachomatous process the lymph-follicle plays a part, as has already been shown by Schweigger, Preuss, Wolfring, etc., etc. The formation of trachoma in a histological sense is dependent upon a circumscribed lymphatic infiltration, leading to hyperplasia, upon follicular formations, with simultaneous pathological changes in the epithelium. In trachoma the supporting structure of the adenoid tissue in the conjunctiva is hardly changed, its meshes being very delicate, and the cells at the nodal points comparatively small.

In adenoid tumors, on the contrary, this framework is very much thicker, and frequently developes into a strong net-work of connective tissue. In trachoma there is no evidence of a new formation of tissue, unless we look upon the production of follicles as such.

Adenoid tumors of the conjunctiva, on the contrary, are new productions, in which there are no follicular formations nor complications of the epithelium. There is no circumscribed hyperplasia of adenoid tissue, but there is a diffuse enlargement resulting from new formation:

From the above-described conditions we may draw the following conclusions:

1. These tumors are independent of trachoma of the conjunctiva.
2. They can totally disappear after partial extirpation.

3. The structure of the so-called amyloid tumors is the same as that of lymphoid tumors.

4. These tumors may show extensive hyaline degenerations, without the formation of amyloid masses.

5. Amyloid invariably develops in parts of the tumor that have already undergone hyaline degeneration.

Dorpat, September, 1880.

DERMOID TUMOR OF THE CORNEO-SCLERAL MARGIN.

By J. N. OELLER, M.D., of Munich.

Translated by Isidor Furst, of New York.

(*With plate VI.*)

UP to the present time, to the best of my knowledge, only extirpated dermoid tumors have been examined and described, and, therefore, we do not know any thing positive about the manner of their extension into the depth and over the surface of the adjacent parts. Although the present case occurred in the eye of a pig, the detailed description of the anatomical relations might offer something of interest from this point of view. I have failed to learn any thing about the condition of the lids.

The tumor was very firm to the touch; its larger portion was situated on the external corneo-scleral margin, but extended fully 2 *cm.* beyond it on to the corneal tissue. From the apparently quite normal, transparent cornea it was separated by a distinct border measuring 1 *cm.* The width of the tumor, from this border to the spot where it merged into the normal conjunctiva, was likewise 1 *cm.** Its surface, even in its fresh condition, showed numerous papillary elevations and depressions, from which, particularly in the central parts of the tumor, a considerable number of brownish, coarse bristles, not above 3 *mm.* long, were projecting. From the microscopic sections it may be seen that the extreme thickness of the swelling was opposite to the angle of

* All the dimensions are those of the hardened preparation.

the iris, measuring 3½ *mm.* Even the unaided eye recognizes a gland, situated deep in the thicker, external half of the tumor, almost immediately upon the scleral tissue, 3½ *mm.* in its longitudinal and 2 *mm.* in its transverse diameter, of a distinctly tubular structure. The section has divided the convoluted glandular tube into many transverse (0.080–0.140 *mm.*) and longitudinal cuts, of varying size, thus opening a whole system of chambers. The interior of these chambers is to a great extent invested with flat, partly polygonal, partly hexagonal epithelium with well-pigmented nuclei; to some extent, too, with more conical epithelium, especially at the peripheral parts of the gland.

The hyaline membrane forming the covering of the tubes exhibits a beautiful, characteristic drawing, having very clearly-defined equidistant striæ, parallel to the direction of the tube. The several convolutions of the tubes are held together by a narrow layer of a loose connective tissue with fine fibres, in which numerous fusiform nuclei are imbedded. Unfortunately, the sections did not succeed perfectly, so that nothing positive can be reported about the termination of the excretory duct of this large gland. It certainly does not terminate beneath the epithelial covering of the tumor, and I think I may safely assume that it penetrates into the sac of the hair which, at that spot, projects into the immediate neighborhood of the gland; on the several preparations, at least, we find, close to the hair-sac, portions of a severed efferent canal which might belong to this gland. The hair exhibits all the normal characteristics of such. Besides, to the right and left, the efferent duct of an acinous gland, much smaller than the one first described, terminates in the neck of the hair-sac; from the external left gland some single acini project backward into the immediate neighborhood of the former large gland; they are probably sebaceous glands; the nuclei of the large enchyma-cells are very faintly tinted. The layer of connective tissue limiting the glandular sac externally, is interspersed with a multiple layer of nuclei. The thicker hairs are found in the central parts of the tumor; those approaching the corneal end are thinner, but even into them

some small sebaceous glands are inserted laterally. Several hairs are obviously about to fall out.

The tissue proper of the tumor is formed by a very firm connective tissue (and some sparse elastic fibres), in which not a trace of fat-cells can be demonstrated even in the deeper layers. Its broad bundles, in the superficial layers, run mostly parallel to the surface of the tumor; but in the deeper layers which adjoin the cornea and sclerotic they represent a confused interlacing of fasciculi, in which only sparse, oblong connective-tissue corpuscles are imbedded. The connection of the tumor with the underlying formations is most intimate in front of the large gland, opposite the iris-angle. Here we find a rather dense intermixture of connective-tissue trabeculæ which ascend vertically, and thereby clearly mark the limit between the tumor and the horizontally extending scleral fibres or corneal lamellæ; the most superficial of them appear as if disunited at the place of transition. The connection toward the outside is the most lax; a large fold of conjunctiva there indicates the border between tumor and normal conjunctival tissue. Below this fold, exactly between subconjunctival and scleral tissue, a fully-formed vascular net extends as far as beneath the large gland. Toward the corneal margin the dense connective tissue gradually changes into delicate, loose connective tissue, with more numerous nuclei, which extends in more parallel divisions, but still gradually thinning out, for a considerable distance from the limit of the tumor, as recognizable to the naked eye, between corneal epithelium and corneal lamellæ. Here, too, the contour between connective tissue and normal structure is clearly marked, both by the straight course of the former and the finely undulating course of the latter; partly also by the different tint.

The epithelium, as far as it covers the tumor, is formed of the usual epidermic elements which have become horny in the outermost layers. This epithelium, however, gradually changes into normal corneal epithelium at the corneal limit of the tumor. Especially in the medial parts of the new formation, the epithelium exhibits numerous depres-

sions of varying depth and width. The papillæ projecting between these depressions show the ordinary structure of vascular papillæ of the skin, at least I have not noticed any nervous formations in them. A vascular loop rises into each papilla. These papillæ gradually decrease in size toward the corneal limit of the neoplasm. But they continue for fully 2 *mm.* from the limit of the tumor, as determined by the unaided eye, into the apparently normal corneal tissue. The corneal epithelium is raised either in its entirety in the form of the smallest papillæ of 0.045 *mm.*, or the capillary loops crowd upward only Bowman's membrane, and with it the basal cells situated upon it, without, thereby, in the least, altering the straight outline which the external layers of the corneal epithelial cells present.

The number of vessels terminating in the tumor are not disproportional to its size. It seems surprising, though, that the adventitial sheaths of all vessels, both those projecting into the papillæ and those coursing below, carry quite an enormous number of roundish nuclei, measuring 0.006 *mm.*, so as to present the deceptive appearance of solid tubular cell-buds, were it not for the fact that the characteristic nuclei of the adventitia are perceptible here and there.

I refrain from entering here into the discussion of the pathogenesis of this formation, equally rare in men and animals, which, according to the investigations of Rybá, seems to be caused by disturbances of development. The entire structure of the tumor will sufficiently justify the diagnosis of dermoid tumor. Certainly, the quite exceptionally developed gland in the depth of the tumor is most surprising. To assume it to be a convoluted, a sudoriparous gland will not be questioned, especially as these bodies exhibit an exceptional development in the hog, and occur even in the conjunctiva of that animal. The pronounced tubular structure of the gland and rarely beautiful characteristic striation of the hyaline membrane indicate it to be a sudoriparous gland. In this connection I would venture the remark that the epithelium of the gland is to a great extent of the flat variety, while the ordinary text-books on histology teach that the sudoriparous glands have a conical or cylindrical epithelium. The circumstance that the excre-

tory duct of the gland certainly does not terminate under the epithelium is no proof against its sudoriparous nature. In the epidermis of the head we likewise find sudoriparous glands emptying into the hair-sacs, and the modified sudoriparous glands at the edge of the lid always empty into a sebaceous follicle.

Of much greater interest in a practical direction than this, even for a hog, enormously large sudoriparous gland, is the condition of the corneal end of the tumor. Although dermoid tumors are included among the so-called benign neoplasms, being congenital formations which ordinarily remain stationary, they may still become progressive, especially when they occur in a not quite pure form, and may lead to loss of sight by a rapid extension over the cornea. The microscopical demonstration of minute papillæ, even more than 2 *mm.* from the apparent limit of the tumor, in the seemingly healthy corneal tissue, proves the correctness of the law of practical surgery: in the presence of all, even the benign neoplasms, to not only extirpate them, but also, if feasible, as much as possible of the adjoining apparently normal tissue.

In this respect I refer to the case published by Fuchs in the April number of *Zehender's Monatsblätter* (xviii, Jahrgang, p. 131), in which, on account of restless narcosis, a small remnant was allowed to remain upon the cornea, from which a partial regeneration of the tumor sprang in the next few weeks. The microscopic demonstration of minute papillary epithelial elevations may perhaps afford us some information how we have to picture to ourselves such an apparently rare regeneration of the tumor. In consequence of the reaction following upon the irritation of the operation, the vessels remaining after an imperfect extirpation will develop more strongly by collateral channels, and the original, minute papillary elevations become ordinary vascular papillæ; besides these, of course, the underlying connective tissue will proliferate.

It would be an interesting question whether in the regenerated portion a development of glands, etc., will again take place. As far as I know, no observation is recorded on this point; the possibility, however, can certainly not be denied.

COMPARATIVE INVESTIGATIONS INTO THE EFFECTS UPON THE EYE OF ATROPINE, DUBOISINE, AND HOMATROPINE.

By HERMANN SCHÄFER, M.D.

Translated by ISIDOR FURST, of New York.

SINCE the introduction of atropine and duboisine as mydriatics into ophthalmology, many authors have made experiments regarding the physiological effects and practical application of these agents.*

In 1879, after the first appearance of a thorough treatise on duboisine by Dr. Fouqué, Prof. v. Hippel requested me to test the results obtained by the investigator just named, and for this purpose kindly put at my disposal the laboratory and inmates of the ophthalmic clinic of Giessen.

Before entering upon my own experiments, I beg to present a brief résumé of the results obtained by Fouqué. In his experiments he employed a concentration of 1:200. After instilling a drop of this solution, the pupil began to dilate in from 9 to 13 minutes; complete dilatation was reached after 25 minutes, and continued for 2½ to 3 days. The mydriasis receding gradually, the pupil had re-

* Literature: v. Gräfe's papers on atropine in the ARCHIV F. OPHTH., Bd. i, H. 1, p. 223; Bd. i, H. 2, p. 241; Bd. ii, H. 2, pp. 96, 214; Bd. iii, H. 2, p. 156, *et al. ibid.*; Dr. Fouqué, de la Duboisine, Paris, 1879; Hirschberg's *Centralblatt f. prakt. Augenheilk.*, H. 4 and 5, 1879, pp. 116 and 143; Romiée, H., Atropine, Duboisine, Gelsemine, *Ann. de la Soc. méd.-chir. de Liège*, 1879, Bd. xviii, pp. 258-262; M. Macnaughton Jones, On the Application of Duboisine, Gelsemine, and Eserine in Ophthalmic Practice, *Brit. Med. Journ.*, Sept., 1879; Loring, F. B., The new Mydriatic, *Nat. M. Rev.*, Wash., 1878-1879, pp. 235-237; Seely, *Arch. f. Augenheilk.*, Bd. viii, H. 3 and 4, p. 246, 1879; Dr. Ad. Weber, über Calabar und seine therapeut. Verwendung. ARCH. F. OPHTH., Bd. xxii, H. 4, p. 215.

gained its normal width in 4 to 4½ days. Complete paralysis of the ciliary muscle ensued from the 15th to the 30th minute after the instillation, persisted 36 to 48 hours, and decreased rapidly in the course of the third day.

"*At the beginning of the fourth day*, the accommodation had regained its full range." For therapeutical purposes Fouqué recommends the application of duboisine in two cases,—for the quick determination of the state of the refraction, and for patients in whom protracted employment of atropine has produced symptoms of local irritation or general intoxication.

When I had nearly terminated my investigations on atropine and duboisine, Prof. v. Hippel received, together with an invoice of drugs from E. Merck, of Darmstadt, a small quantity of crystallized hydrobromate of homatropine (discovered in 1879 by Prof. Ladenburg, of Kiel), with the request to test the efficiency of the medicament. This task, Prof. v. Hippel delegated to me.

As regards the arrangement of my experiments, I have tested:

1. The influence of atropine, duboisine, and homatropine upon the pupil of rabbits and man.
2. Their influence upon accommodation.
3. The relation of eserine to these three agents.
4. Their transmissibility.
5. Their practical applicability.

In order to afford a better insight, from the great number of tests with each agent, I will first present single detailed descriptions of the experiments, and then append the deductions drawn from them as well as from those not here specially reported.

I. EFFECT UPON THE DIAMETER OF THE PUPIL.

1. IN RABBITS.

Atropine and Duboisine.

Black- and white-speckled rabbit. Pupillary diameter (P) =6½ *mm.** on both sides; pupil longitudinally oval.

* The width of the pupil was determined in millimetres, its diameter being measured directly with compasses.

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
May 29	4.	Instillation of a drop of a ½-per-cent. solution of atropine.*	Instillation of a drop of a ½-per-cent. solution of duboisine.
" 29		P—unchanged.	P—7 *mm.*
" 29	4.10	P—7 *mm.*†	P—7½ "
" 29	4.15	P—7½ "	P—8 "
" 29	4.20	P—8½ "	P—9 " reaction has ceased.
" 29	4.25	P—9 " reaction has ceased.	P—9 "
" 29	4.30	P—9 "	P—9 "
" 29	8.45	P—9 "	P—9 "
	A.M.		
" 30	8.30	P—8-9 "	P—9 "
" 30	3.24	P—6½ "	P—7 "
" 30	5.	P—6½ "	P—6½ "

Atropine.

a. Beginning of the mydriasis.—The first indications, after instilling a drop of a ½-per-cent. solution, occurred on the average from four determinations in seven minutes; the shortest incipient period was five minutes; the longest, ten minutes.

b. Increase of the mydriasis.—The increase in dilatation ensued rather quickly; on an average, in about fourteen minutes after instillation the dilatation of the pupillary diameter (in every instance the transverse diameter was measured under uniform illumination) had reached *one-half*, after an average of thirty minutes, the *full extent*. In this connection it must be remarked that in two parallel determinations the dilatation of the atropinized pupil reached the same degree as that of the duboisinized one; while in the other two parallel tests, the full dilatation of the atropinized pupil was 1 *mm.* less than that of the duboisinized one, probably because the rabbits, despite the precautions, had pressed out some of the instilled fluid.

From the preceding it follows that the time from the commencement of mydriasis to its full extent is much longer than the time from the instillation to the commencement.

* All solutions were freshly prepared before the experiments.

† During the first 10 minutes care was taken to prevent any of the instilled solution from being pressed out of the conjunctival sac.

The reaction to light had ceased, on an average, at the thirtieth minute.

c. Height of the mydriasis.—It persisted, on an average, for sixteen hours, after which time the iris regained its reaction.

d. Duration and decline of the mydriasis.—In the determinations the mydriasis, on an average, declined to the normal in twenty-four hours; minimum in twenty-three, maximum in twenty-seven hours.

Duboisine.

a. Beginning of the mydriasis.—The first indications, after instilling a drop of a $\frac{1}{2}$-per-cent. solution, showed themselves in four tests, on an average, in five minutes; minimum incipiency four, maximum ten minutes.

b. Increase of the mydriasis.—It ensued more rapidly than on the atropinized eye; on an average, in about nine minutes after instillation the dilatation of the pupillary diameter had reached *one-half;* in an average of twenty minutes, the full extent, the pupil dilating in all cases ad maximum.

As in the atropinized eye, so in this the time from the ascertained commencement of the mydriasis to its height is longer than that from the instillation to the commencement.

The reaction to light in this case had disappeared by the fifteenth minute.

c. Height of the mydriasis.—It persisted, on an average, for eighteen hours, after which time the pupillary reaction also began to return.

d. Duration and decline of the mydriasis.—Ensued more slowly than in the atropinized eye, on an average, in 26 hours; minimum in 24 hours, maximum in 27 hours. The decline to the half extent lasted about 20 to 22 hours, while the remaining decline to the normal occupied but two to three hours more.

Homatropine.

Grayish-white rabbit. P = 6 *mm.* on both sides.

DATE.	HOUR.	RIGHT EYE.	DATE.	HOUR.	LEFT EYE.
May 24	3.24	Instillation of a drop of a ½-per-cent. solution of homatropine.	May 25	3.41	Instillation of a drop of a ½-per-cent. solution of homatropine.
" 24	3.29	P—6 *mm.*	" 25	3.46	P—6½ *mm.*
" 24	3.34	P—8 " sluggish reaction.	" 25	3.51	P—7 "
" 24	3.39	P—8 *mm.*	" 25	3.56	P—8 "
" 24	3.44	P—8 "	" 25	4.1	P—9 "
" 24	3.49	P—8 " reaction has ceased.	" 25	4.11	P—10 "
" 24	3.54	P—8 *mm.*	" 25	4.26	P—10 "
" 24	3.59	P—nearly 9 *mm.*	" 25	4.30	P—10 "
" 24	4.37	P—10 *mm.*	" 27	3.30	P—6 "
" 24	5.25	P—10 "			
" 24	7.	P—10 " no reaction.			
" 25	9.45	P—6 " very strong reaction.			
" 25	3.	P—6 *mm.*			

a. Commencement and increase of the mydriasis.—The first indication, after instilling a drop of a one-half-per-cent. solution, ensued in three determinations with two animals in five minutes; in the third, in seven minutes. In ten minutes after instillation the pupil had dilated to *one-half*; in an average of 35 minutes to the *full extent* (minimum in 30, maximum in 40 minutes).

b. The height of the mydriasis persisted but a few hours.

c. Duration and decline of the mydriasis.—The duration is very brief, and the decline proceeds quite rapidly, so that in the three determinations the pupil had returned to the normal, in two cases in 24 hours, in the third as early as 18 hours,

2. IN MAN.

Atropine and Duboisine.

Atropine.

a. Beginning of the mydriasis.—The first indications, after instilling a drop of a ½-per-cent. solution, ensued in nine determinations (comparative tests with duboisine in the same persons), on an average, in 14 minutes; maximum in 15, minimum in 10 minutes.

H. W., æt. 12 years, bilateral Hp. $\frac{1}{40}$. P on both sides =4 *mm.*

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
May 13	3.7	Instillation of a drop of a ½-per-cent. solution of *atropine.*	Instillation of a drop of a ½-per-cent. sol. of *duboisine.*
" 13	3.12	P=4 *mm.*	P=4.5 *mm.*
" 13	3.17	P=4.5 "	P=5 "
" 13	3.25	P=6 "	P=7 "
" 13	3.35	P=8 "	P=9 " reaction has ceased
" 13	3.45	P=9 " reaction has ceased.	P=9 "
" 13	3.50	P=9 "	P=9 "
" 13	5.3	P=9 "	P=9 "
" 14	9.	P=9 "	P=9 "
" 14	12.	P=9 "	P=8 " reaction present
" 14	3.	P=8 "	P=7 "
" 15	3.	P=8 "	P=6 "
" 16	10.	P=8 "	P=5–6 "
" 17	10.	P=7 "	P=4–5 "
" 18	11.	P=7 "	P=4 "
" 19	10.30	P=5 "	
" 20	9.	P=4 "	

b. Increase of the mydriasis.—The increase of the mydriasis occurs rather quickly. The dilatation of the pupillary diameter had reached in an average of 20 minutes (minimum in 15, maximum in 25 minutes) *one-half*; in an average of 36 minutes after instillation, the *full extent* (minimum in 30, maximum in 45 minutes). The time from the beginning to the height of the mydriasis is longer than that from the instillation to the commencement.

The reaction to light disappeared in 25 to 30 minutes after instillation.

c. Height of the mydriasis.—The greatest dilatation amounted, on an average, to 4.33 *mm.* more than the normal width of the pupil; the least, 3 *mm.* (in old people); the greatest, 5 *mm.* It remained at its full height, on an average, for 26 hours.

d. Duration and decline of the mydriasis.—On an average, in 4½ days (minimum in 3, maximum in 7 days) the pupillary diameter had returned to the normal.

e. Concomitant phenomena.—With increasing dilatation of the pupil, a decline of visual acuteness set in.

Duboisine.

a. The first indications, after instilling a drop of ½-per-cent. solution, showed themselves in 19 (including 9 comparative experiments with atropine on the same persons) determinations, on an average, in 8 minutes; minimum in 5, maximum in 10 minutes.

b. Increase of the mydriasis.—The dilatation of the pupil proceeds much more rapidly than on the atropinized eye. The pupillary diameter had reached, on an average, in 10 minutes (minimum in 7, maximum in 15 minutes) *one-half*; in 19 minutes (minimum in 15, maximum in 25 minutes), the *full extent.*

The time from the beginning to the height of the mydriasis is, in this case also, longer than that from the instillation to the beginning.

The reaction of the pupil disappeared in 15 minutes after instillation.

With atropine, as with duboisine, the refractive condition of the eye (E., M., or Hp.) has no influence upon the development of the mydriasis; but in old people the dilatation ensues later, and develops more gradually and to a less extent.

c. Height of the mydriasis.—The maximum dilatation amounted, on an average, to 5 *mm.* more than the normal width of the pupil; the least to 3 (in old people); the greatest to 5½ *mm*, and, on an average, persisted for 24 hours.

d. Duration of the mydriasis.—The duration of the mydriasis extended, on an average, to 4 days; minimum 2, maximum 6 days.

Homatropine.

a. ½-per-cent. *solution.*

a. Beginning of the mydriasis.—The first indications after instilling a drop ensued, on the average, from seven determinations, in 9 minutes; minimum incipient period 5, maximum 15 minutes.

b. Increase of the mydriasis.—The increase of the mydriasis proceeds rather slowly. Of seven determinations a

P. B., 28 years old. E. P=4 *mm.*

DATE.	HOUR.	RIGHT EYE.
May 26	3.25	Instillation of a drop of a ½-per-cent. solution of *homatropine.*
" 26	3.30	P=5.2 *mm.*
" 26	3.35	P=6 "
" 26	3.45	P=6 "
" 26	3.55	P=6.5 "
" 26	4.5	P=7 " no reaction.
" 26	4.15	P=7 "
" 26	4.25	P=7 "
" 26	7.	P=6 " strong reaction.
" 27	9.	P=4 "

H. H., æt. 17. E. P=3 *mm.*

DATE.	HOUR.	RIGHT EYE.
June 3	11.37	Instillation of a drop of a ½-per-cent. solution of *homatropine.*
" 3	11.42	P=5 *mm.*
" 3	11.47	P=5 "
" 3	11.57	P=6 "
" 3	12.7	P=7 " no reaction.
" 3	12.17	P=7 "
" 3	12.27	P=7 "
" 3	3.	P=7 "
" 3	5.	P=6 " reaction present.
" 4	11.30	P=3 "

El. B., æt. 18. E. S=1. P on both sides=3½ *mm.*

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
June 3	3.27	Instillation of a drop of a 2-per-cent. solution of *homatropine.*	Instillation of a drop of a 5-per-cent. solution of *homatropine.*
" 3	3.32	P=4½ *mm.*	P=4½ *mm.*
" 3	3.37	P=5 "	P=5–6 "
" 3	3.42	P=6 "	P=9 " no reaction.
" 3	3.47	P=7 " no reaction.	P=9 "
" 3	3.57	P=7 "	P=9 "
" 3	4.7	P=7 "	P=9 "
" 3	4.17	P=7 "	P=9 "
" 3	5.	P=7 "	P=9 "
" 4	10.	P=5 " reaction present.	P=6½ "
" 4	3.	P=3½ "	P=3½ "

maximum dilatation of the pupillary diameter was obtained in but two cases, those of two young people, in the first of whom the maximum dilatation ensued in 40, in the second in 30 minutes after instillation; half the dilatation had occurred in the first case after 10, in the second after 20 minutes. In the remaining five determinations full dilatation was not obtained, the dilatation progressing only slightly beyond the width usually prevailing in oculo-motor paralysis (7 *mm.*). This degree was reached, on an average, in 33 minutes (minimum in 25, maximum in 40 minutes). The reaction to light had ceased in about 15 to 20 minutes.

c. Height of the mydriasis.—The height of the mydriasis persisted for about 3 hours.

d. Duration and decline of the mydriasis.—The duration is very brief, and the mydriasis declines very quickly. After an average of 24 hours (minimum after 16 hours, in but one case after 2½ days) the pupil had returned to the normal.

b. 1-per-cent. to 5-per-cent. *solutions.*

a. Beginning of the mydriasis.—The first indications after instilling a drop ensued in all solutions in about 4 to 5 minutes.

b. Increase of the mydriasis.—In 15 minutes after instillation the pupillary diameter, measuring normally on an average 3 *mm.*, had dilated:

		With	1-per-cent. solution to	6	*mm.*
		"	2 "	7	"
		"	3 "	7	"
		"	4 "	7	"
		"	5 " ad maximum (9 *mm.*).		
In	30 minutes,	"	1-per-cent. solution to	7	"
		"	2 "	7	"
		"	3 "	7	"
		"	4 "	7	"
In	35 "	"	1 "	7	"
		"	2 "	7	"
		"	3 "	7	"
		"	4 "	8	"
In	40 "	"	1 "	7	"
		"	2 "	7	"

In 40 minutes,	With	3-per-cent. solution to	8	*mm.*
	"	4 "	8	"
In 50 "	"	1 "	7	"
	"	2 "	7	"
	"	3 "	8	"
	"	4 "	8	"

c. The height of the mydriasis persisted about three or four hours with all solutions.

d. Duration and decline of the mydriasis.—Both are very short, the decline of the pupil to the normal being completed in 24 to 26 hours with all grades of concentration.

II. INFLUENCE ON ACCOMMODATION.

The experiments on the accommodation were made with Sn 1 as test-type, which was read through a convex lens of ten inches focus.

Atropine and Duboisine.

Jan. K., æt. 30. E. S = 1. On both sides Sn 1 is read without a glass at 20 inches. On both sides Sn 1 is read with + 10 from 3 inches up.

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
May 14	10.	Instillation of a drop of a ½-per-cent. solution of *atropine.*	Instillation of a drop of a ½-per-cent. sol. of *duboisine.*
" 14	10.10	*p* at 3 inches	*p* at 4 inches
" 14	10.20	*p* at 3 "	*p* at 5 "
" 14	10.30	*p* at 4 "	*p* at 5–6 "
" 14	10.45	*p* at 5 " {Sn 1 is still read without a glass at 20 inches.	*p* at 7 " {Sn 1 is no longer read at 20 in. without a glass
" 14	11.	*p* at 6 "	*p* at 8 "
" 14	11.15	*p* at 7 " {Sn 1 is no longer read at 20 in. without a glass	*p* at 9 "
" 14	11.30	*p* at 8–9 "	*p* at 10 "
" 14	12.10	*p* at 10 "	*p* at 10 "
" 14	3.	*p* at 10 "	*p* at 10 "
" 15	3.	*p* at 6 "	*p* at 4 "
" 16	10.	*p* at 3 "	*p* at 3 "

Atropine.

a. Commencement of the change of accommodation.—According to three determinations, the change in the accom-

modation begins, on an average, in 23 minutes after instilling a drop of a ½-per-cent. solution (the shortest time was 18 minutes); or, reckoning from the beginning of the mydriasis, the above change ensued in 12 minutes thereafter (minimum in 8 minutes).

b. Development and manner of the change of accommodation.—This consists of a recession of the proximal point (p) until it finally coincides with the distal point (r), this recession proceeding rather slowly and uniformly. After 2¼ to 2½ hours p had coincided with r.

c. The height of the change of accommodation persisted about 18 hours.

d. Duration and decline of the change of accommodation.—The duration of the change of accommodation is, on an average, no shorter than that of the mydriasis; in the determination p returned to the original distance in from 2 to 4½ days.

e Concomitant phenomena.—Decrease of the acuteness of vision and micropsia were constantly perceived.

Duboisine.

a. Beginning of the change of accommodation.—According to seven determinations, the change of the accommodation begins, on an average, in 10 minutes after instilling a drop of a ½-per-cent. solution (the shortest time was 5, the longest 15 minutes), or (in three determinations) in 5 minutes counting from the beginning of the mydriasis; in the remaining four, simultaneously with the commencement of the dilatation.

b. Development of the change of accommodation.—Here, too, p gradually recedes to r, and, in seven experiments, coincides with r, on an average, in 1 hour and 20 minutes (minimum in 35 minutes, maximum in 1½ hours).

c. Height of the change of accommodation.—With duboisine, p remained coincident with r for 12 hours on an average.

d. Duration and decline of the change of accommodation.—The duration of the change of accommodation is not much shorter than that of the mydriasis, and in six determina-

tions *p* returned to the normal in the first case in 20 hours, in the second and third in 2 days, and in the remaining three in 3 to 4 days.

Homatropine

H. H., æt. 17. E. S = 1. Sn 1 with + 10 is read on both sides at from 3 inches up.

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
June 1	10.	Instillation of a drop of a ½-per-cent. solution of *homatropine*	Instillation of a drop of a ½-per-cent. sol. of *homatropine.*
" 1	10.10	*p* at 3 inches	*p* at 3 inches
" 1	10.20	*p* at 3–4 "	*p* at 4½ "
" 1	10.30	*p* at 5½ "	*p* at 5 "
" 1	10.40	*p* at 6 "	*p* at 6 "
" 1	10.50	*p* at 7 "	*p* at 7 "
" 1	11.	*p* at 8 "	*p* at 7½ "
" 1	11.10	*p* at 9 "	*p* at 8 "
" 1	11.20	*p* at 9½ "	*p* at 9 "
" 1	11.30	*p* at 10 "	*p* at 9 "
" 1	11.40	*p* at 10 "	*p* at 10 "
" 1	3.	*p* at 8 "	*p* at 10 "
" 2	3.	*p* at 3 "	*p* at 5½ "
" 3	10.45	*p* at 3 "	*p* at 4 "
" 3	3.	*p* at 3 "	*p* at 4 "
" 4	10.	*p* at 3 "	*p* at 3½ "
" 4	3.	*p* at 3 "	*p* at 3 "

H. H., æt. 17. E. S=1. Sn 1 from 3 inches up with+ 10. Sn 1 is read at 20 inches without glass.

DATE.	HOUR.	RIGHT EYE.
June 3	11.37	Instillation of a drop of a 1-per-cent. solution of *homatropine.*
" 3	11.42	*p* at 4 inches
" 3	11.47	*p* at 5 "
" 3	11.57	*p* at 6 "
" 3	12.7	*p* at 6 "
" 3	12.17	*p* at 7½ "
" 3	12.27	*p* at 10 " Sn 1 is no longer read at 20 inches without a glass.
" 3	12.37	*p* at 10 "
" 3	3.	*p* at 5½ "
" 3	5.	*p* at 4½ "
" 4	11.30	*p* at 3 "

E. B., æt. 18. On both sides E. S=1. Sn 1 with+10 from 3 inches up.

DATE.	HOUR.	RIGHT EYE.	LEFT EYE.
June 26	3.52	Instillation of a drop of a 2-per-cent. solution of *homatropine.*	Instillation of a drop of a 5-per-cent. sol. of *homatropine.*
" 26	3.57	*p* at 4 inches	*p* at 5 inches
" 26	4.2	*p* at 5 "	*p* at 6 "
" 26	4.7	*p* at 6 "	*p* at 7½–8 "
" 26	4.17	*p* at 7 "	*p* at 10 "
" 26	4.20	*p* at 8 "	*p* at 10 "
" 26	4.30	*p* at 10 "	*p* at 10 "
" 26	4.36	*p* at 10 "	*p* at 10 "
" 27	10.	*p* at 4 "	*p* at 4 "
" 27	3.	*p* at 3 "	*p* at 3 "

a. Beginning of the change of accommodation.—After instilling a drop of a ½-per-cent. solution, the change in the accommodation began in two determinations almost simultaneously with the commencement of the mydriasis; the same result was obtained after the instillation of a drop of 1-per-cent., 2-per-cent., and 5-per-cent. solutions.

b. Development of the change of accommodation.—In two determinations with a ½-per-cent. solution, *p* had coincided with *r* in the first case already after 1½ hours; in the second case in rather more than 2 hours. After instilling a drop of a 1-per-cent. solution, *p* was coincident with *r* in 50 minutes; with 2-per-cent., in 39 minutes; with 5-per-cent., in 20 minutes.

c. The height of the change of accommodation persisted generally with all solutions as long as the full height of the dilatation continued.

d. Duration and decline of the change of accommodation.—The decline was effected very rapidly, and coincided in all grades of concentration with the return of the pupillary diameter to the normal.

III.—INFLUENCE OF ESERINE UPON ATROPINE, DUBOISINE, AND HOMATROPINE.

1.—UPON ATROPINE.

After a pupil had been dilated ad maximum by a drop of

a ½-per-cent. solution of atropine, 50 minutes after instillation a drop of a ½-per-cent. solution of eserine was dropped in. Five minutes later the effect of eserine began to be manifested; in about 20 minutes the pupil had only half the former width, but did not continue to contract during the next 15 minutes; therefore, a second drop of eserine was instilled, with the effect of contracting the pupil by about 1 *mm.* in 5 minutes, when its action began to flag, so that by and by two more drops of eserine were required in order to bring the pupil to the normal width within the next 40 minutes. But after the lapse of 1½ hours the atropine effect again prevailed and caused a nearly mean dilatation.

2.—UPON DUBOISINE.

In the same manner an experiment with duboisine was made on the other eye of the same person. Fifty minutes after the instillation of the duboisine a drop of (½-per-cent.) eserine was instilled, which did not act until 5 minutes later, and after 30 minutes had brought the pupil to the half width, when it ceased to act. At the same time, as on the atropinized eye, another drop of eserine was dropped into this, which narrowed the pupil but slightly in the next 20 minutes. In order to contract the pupil to the normal width two further drops of eserine were needed, which had accomplished that effect in 40 minutes.

After 1½ hours the effect of the eserine was likewise overwhelmed by that of the duboisine, and the pupil dilated again, but not quite as much as on the atropinized eye.

On the following morning the pupils were normal on both eyes.

3.—UPON HOMATROPINE.

A drop of a ½-per-cent. solution was instilled into the eye of an E; in 20 minutes the pupil had dilated to 7 *mm.*, and remained stationary.

Having instilled a drop of a ½-per-cent. eserine solution into the conjunctival sac, an effect upon the pupil became manifest after ten minutes, and after 50 minutes the pupillary diameter was again normal.

As the subsequent behavior of the pupil had not been observed in this case, a second test was made with another E in the same manner.

In this case, likewise, ten minutes after instilling the eserine, its effects began to appear, and after 40 minutes the pupillary diameter was again normal.

In the further course, neither on the same nor the following day was a subsequent re-dilatation of the pupil noted.

After this series of experiments we may state, in regard to the influence of eserine upon the three agents, that it counteracts the effects of homatropine completely and permanently; that of duboisine, and more particularly that of atropine, however, only when instilled in larger quantity, and then only for a brief period, after which it yields again to the effects of the latter.

IV.—EXPERIMENTS REGARDING THE TRANSMISSIBILITY OF ATROPINE, DUBOISINE, AND HOMATROPINE.

Atropine.—A drop of a ½-per-cent. solution was instilled into the eye of a rabbit, and 15 minutes later the anterior chamber was tapped with a Pravaz's syringe, and thus nearly the entire aqueous humor was collected.

Of the latter, four drops were immediately instilled into the conjunctival sac of another rabbit; 15 minutes later the first indications of pupillary dilatation were noticed; after 40 minutes the dilatation had reached one-half, and after 1 hour and 15 minutes, the full height.

Duboisine.—Two experiments were made in a similar maner with duboisine.

In the first experiment, 15 minutes after instillation of the duboisine, the eye was tapped and about 1½ divisions full of a Pravaz's syringe of aqueous humor collected. Fifteen minutes after instilling 4 drops of this aqueous humor into the left eye of another rabbit, the pupil had dilated one-half; after 30 minutes, to the full extent. The rest (4 drops) of the collected aqueous humor was dropped into the right eye of the same rabbit, and here full dilatation of the pupil ensued in 40 minutes.

For the control of the last experiment, a second one was made in a quite similar manner. The puncture made after fifteen minutes yielded about one division full of aqueous humor, four drops of which were instilled into one eye of a rabbit. In twenty minutes the dilatation of the pupillary diameter had already exceeded one-half, and after thirty minutes it had reached the full height.

Homatropine.—One drop of a one-half-per-cent. solution of homatropine was instilled into the conjunctival sac of a rabbit. A puncture of the anterior chamber, made after fifteen minutes, yielded about two divisions full of a Pravaz's syringe of aqueous humor. Ten minutes after instilling four drops of this into the eye of another rabbit, the pupil dilated by 1 *mm.*, but remained stationary at this width for twenty minutes; therefore, the rest of the collected aqueous humor was instilled. In the succeeding forty minutes the pupil was dilated nearly ad maximum.

The absorption into the aqueous humor of these three substances, as well as their transmissibility, may be considered demonstrated by the above experiments. The aqueous humor containing duboisine acts most rapidly when transferred. Aqueous humor containing atropine and duboisine secures maximum dilatation, but that charged with homatropine does not effect this result completely.

In general, from the whole number of experiments made, it is sufficiently demonstrated that, as respects the *dilatation of the pupil*, atropine, if somewhat slower, possesses a more lasting influence than duboisine; that the latter dilates the pupil in a shorter time, and momentarily acts more energetically, but loses its influence more quickly; finally, that homatropine develops its influence in a briefer time than either of the other agents, but produces a lesser dilatation of the pupillary diameter, and is the first to decline in its effects.

The degree of concentration in which the homatropine is employed is apparently without influence upon the duration of the effect.

The *accommodation* is paralyzed most rapidly by duboisine and homatropine, by duboisine even a little more so than

by homatropine; with the latter, however, the normal state returns in twenty-four hours, with duboisine after three to four days. Paralysis of the accommodation by atropine proceeds very gradually and persists the longest.

In accordance therewith would be the *practical applicability* of the three agents: Where it is desired to secure simply dilatation of the pupil for the purpose of examining the fundus, or to paralyze the accommodation for the certain determination of the state of refraction, homatropine is decidedly to be preferred to the other two drugs.

If, on the other hand, a *therapeutical effect* is desired, homatropine is to be set aside, on account of its insufficient and too restricted effect, and the application of atropine and duboisine can alone enter into consideration.

As regards this therapeutical application, after preceding employment of atropine for some length of time in cases where it had been used with but partial success for the dilatation of the pupil in iritic conditions with and without extensive synechiæ, duboisine was likewise employed for a protracted period.

In this way it was shown that although duboisine momentarily exhibited a more intense effect, yet, as may be expected from the above-described experiments, it also declined in its action more quickly than atropine.

Synechiæ which had resisted atropine could be resolved by duboisine only four times in ten cases, and even then not completely.

Conjunctival and ciliary injection diminished more rapidly under the employment of duboisine than under that of atropine.

Duboisine, too, even in greater concentration, never caused irritation of the bulbar conjunctiva, which is sometimes the case with atropine; nay, more, in cases in which an acute atropine conjunctivitis had set in, the symptoms of irritation rapidly improved when duboisine was employed in place of the atropine.

After I had finished these investigations, I saw the dissertations of Goetz* on homatropine, in which essen-

* Inaug. Dissert. by Emil Goetz: "Das Homatropin in der Augenheilkunde." Kiel, 1880.

tially the same results are recorded with that drug which I had obtained by my investigations.

In my determinations, however, the paralysis of the pupil and of the accommodation lasted somewhat longer; besides, after the pupillary diameter had reached the height of dilatation, I could never see any degree of iris reaction remaining.

As a third point of difference, the fact should be pointed out that in my experiments with one-half-per-cent to five-per-cent solutions the accommodation was always completely paralyzed.

A CASE OF QUININE AMAUROSIS.

By CHARLES E. MICHEL, M. D., St. Louis, Mo.,

PROF. OPHTHALMOLOGY, MO. MEDICAL COLLEGE.

J. G., æt. 38, farmer, married. First seen March 2, 1880. Looks healthy. Says that he has had three or four attacks of pneumonia; last one in 1874. States that his father died of phthisis in his 59th year; two paternal aunts also died of same affection, one at 30 and the other at 60 years.

Never had any malarial affection that he "knows of." Monday, February 2, 1880, was "taken with a chill and dull pain in the chest;" this last increased, and was attended with great difficulty of respiration up to February 5th, then subsiding, it disappeared about February 11th.

It appears from the evidence of one of the attending physicians, Dr. P., who had known the patient from infancy, that he had "had frequent attacks of pneumonia," and, moreover, when called in consultation, he was told that G. "had coughed up and expectorated some blood before he was taken down" this time. Dr. S. saw the patient the day he was taken, February 2d, at 5 P.M. He writes me under date of March 3d: "I found him with intermittent fever, some pain in right lung, bowels constipated. * * * Gave him quinine. * * * Was called to see him again the night of the 3d; found him with cold surface, cold clammy sweat, extremities very cold, very labored breathing, and quite restless. I gave him quinine. * * * By morning (Wednesday) reaction came on. Continued quinine. * * * On night of 4th (Wednesday, the night he became blind), found him as on previous night. * * * Gave him quinine during the night, * * * every night when the stomach would retain it."

Dr. P., in response to my inquiries, writes: "I was called to see

Mr. G. (in consultation) with Dr. S. on Feb. 5th. Was told that G. had been taken with a very severe congestive chill, but was a little better that morning. Treatment had consisted of quinine, whiskey, camphor, morphia, and carbonate of ammonia. Upon examining him, I found him totally blind; could not discern the strongest light; very deaf; pulse frequent, small, and somewhat irregular; tongue with a heavy brown dry coat in the centre, with red edges; bowels distended and tender; quite restless; some cough and dulness upon percussion of the left lung. When aroused, appeared to be rational, but when not, some muttering delirium. Could not convince him that he was at home. The pupil of the eye was small, the reverse of what it was when I saw him on his way to St. Louis (March 1st). I have known him from a child; has had frequent attacks of pneumonia; never had syphilis; been quite healthy. Saw no evidences of congestion of the brain. On inquiry found that he had taken a very large amount of quinine, and from his being so deaf, came to the conclusion that it must have resulted from that cause, as I knew of a similar case, in the year 1845, which recovered as the patient regained his strength."

From the most reliable data I conclude that the quantity of quinine taken by the patient was as follows: From February 2d, at 5 P.M., to February 3d, about 24 hours, ℈ij of quinia in 3-gr. doses (home-made pills) were taken and retained. From evening of 3d to 7 P.M. on 4th, took and retained ℈ijss. of quinia in powders, 10 grs. each. From 7 P.M. February 4th to 7 A.M of the 5th, 220 grains of quinia in powders were administered, a part of which was not retained; possibly one-half may have been vomited; as soon as a dose was rejected, another was given. The exact time when the stomach became irritable is not determinable, but so much is known: One-half ounce of quinine was purchased, and the patient commenced to take from that parcel ten-grain doses at 7 P.M., and continued to receive the same doses until near midnight, when he became blind; after that time very much smaller doses were administered, and at 7 A.M. February 5th there remained of the half ounce not more than about 20 grains; hence, it is probable that about 100 grains were retained from 7 P.M. to midnight, when suddenly, and without pain, vision became totally extinct; in the words of the patient, "just as if you had blown out a lamp." Previous to the blindness, there had been "roaring in the head from the quinia." After this he could not distinguish

articulate sounds; had to be spoken to in the loudest voice, yet was disturbed by the slightest noise; whispering was disagreeable to him. Deafness lasted over ten days, and he never has regained the same acuity of hearing which he possessed before.

Condition of G., March 2d. Both pupils fully dilated; neither the strongest light nor atrop. sulph. affected them one way or other. Absolute absence of perception of light. Optic discs white, with a slight tinge of yellow; the inner third (inverted image) of a somewhat darker hue. Scleral rings very marked. Arteria centralis barely visible as minute threads which could not be followed far from the region of the disc. Veins less than one-half their normal calibre, the walls presenting a slight waviness in their course. Choroid pale.

At apex of both lungs, especially the right one, is heard a markedly prolonged and harsh expiratory murmur. Vocal resonance increased at several points, and dulness on percussion at apex of lungs. In reply to questions, the following history was elicited: Chews tobacco freely, but does not smoke. Is temperate. Drinks neither tea nor coffee habitually. No history of syphilis nor rheumatism. During summer of 1875 suffered from a slight "coup de soleil," and since that time has not been able to expose himself in hot weather "without being oppressed at once." Was confined to his bed for two weeks during his recent illness. Frequently experiences sensations of fainting since this latter attack. Sleeps badly, dreaming constantly; does not "average more than three hours' sleep in the twenty-four." Is languid, and has no appetite.

A competent ophthalmologist, at my invitation, examined the patient ophthalmoscopically, and pronounced it a case of primary atrophy of the optic nerve. Now, while all of the ordinary appearances of atrophy were certainly present, with such a history as the foregoing, I felt justified in denying its presence, irrespective of what might take place later. I held that atrophy of the degree indicated by the appearances of those discs could not possibly have occurred in the short space of one month, and science had yet to recognize the existence of a white disc with minute vessels, which was not indicative of existing atrophy. I regarded them as blanched discs, the cause of which I was disposed to attribute to spasmodic contraction of the musculature of the arterial walls. At my request, Prof. J. K. Bauduy saw and examined this patient March 9th, and, acting on my view of its pathology, suggested the

use of nitrite of amyl, which he that day administered, while I, with the ophthalmoscope, kept the retinal vessels under observation. The amyl was given freely until very marked turgescence of the vascular system of the head was produced, but no appreciable effect was observed on the retinal circulation, hence it was not repeated. Tinct. ferri chlor., and a pill containing phosphor, and ex. nucis vomicæ was prescribed. I also applied daily, twenty-seven times in succession, a mild galvanic current (descending) to the sympathetic, and also to the eyeballs.

March 9th. Arteries and veins show a trifling increase in size and color. Patient thinks that he perceived a very faint "glimmer of light to-day, when he was violently jolted by stumbling.

March 21st. General health of patient had improved up to this time; had slept better; appetite was returning, and he was feeling stronger; to-day feels badly, no appetite, is very languid, and slept badly last night. Retinal vessels are more thread-like than at any time since first seen. From this time to April 1st no improvement, and patient was allowed to return home for a period.

G. was not seen again until Feb. 9, 1881. During this interval he corresponded with me, and took, by my advice, at various times, tr. ferri; phosphor.; zinci phosphide and nux vomica; maltine, with the hypophosphites of iron, lime, and soda; and Horsford's acid phosphates.

First two weeks after reaching home, general health improved, and about that time thought he could tell "when the lamp was lit;" could not locate it, but "thought that he felt its presence." Left home May 11th in a wagon, camping out. About August 1st, while at a chalybeate spring in Arkansas, drinking the waters, he noticed, while using a palm-leaf fan, that in certain positions (when the rays of the sun were reflected from its surface to his eyes) he could appreciate the varying degrees of light.

From the middle of August to the last of September, general health was unsatisfactory, but after that he began to steadily improve, and about the middle of October, at a period corresponding with the best health he had yet enjoyed, he noticed an increasing perception of light, until finally he was one day able roughly to locate the handle of a tin dipper held by some one near him. From this time there was a daily increase in the sharpness of sight, and by the first days of November sufficient central vision had been reëstablished to enable him to read words in a newspaper,

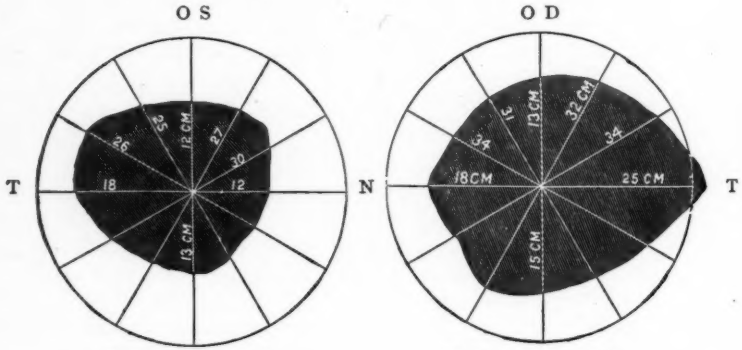
"a few at a time." Patient thinks that there has been no marked improvement since then; he, however, can "catch objects" more readily, the field of vision having certainly increased. Says that he saw single words at first as well as he does now.

February 9th.—Still suffers from great restlessness at nights; does not sleep more than four hours. General health only fair.

February 14th.—Tested to-day. Right, V = $\frac{12}{xv}$; left, $\frac{12}{xv}$; both eyes together, $\frac{12}{xii}$ imperfectly. Field of vision tested at 1 *m.* Right measures in vertical diameter, 23 *cm.*; horizontal, 29 *cm.* Left, vertical diameter, 18 *cm.*; horizontal, 24 *cm.* Pupils in strongest light, 4 *mm.* diameter; 5 *mm.* in ordinary light, and respond slowly.

Ophthalmoscopic examination.—All of the retinal vessels have increased in calibre; arteries about one-third their normal size, veins about one-half. Arteries can be followed about two-thirds their normal course.

March 9th.—Field of vision improved in both eyes. R., vertical, 28 *cm.*; horizontal, 43 *cm.* Left, vertical, 25 *cm.*; horizontal, 30 *cm.* V = $\frac{12}{xii}$. Retinal vessels unchanged.



Left, March 9, 1881. *Right*, March 9, 1881.

May 5th.—Field of vision unchanged in right eye; apparently a little less in left.

Tested with Galezowski's échelle chromatique, he sees no color in grade No. 1 with the exception of red (No. 1 consists of very light shades of red, yellow, green, and blue). In grade No. 5, red and yellow are readily recognized; blue with some difficulty;

green not known; violet looks like "dirty white." In grade No. 10, red, yellow, and blue promptly seen; violet called purple; green looks like a mixture of green, and yellow. In grade No. 15, red, yellow, and blue quickly recognized; green not seen. States that previous to his blindness he did not know colors well; thought it was because he never tried to learn their names.

June 1st.—Field of vision unchanged; size of pupils same, but they respond promptly to light. No change in fundus of eye.

ON QUININE AMAUROSIS; WITH THREE CASES.

By H. KNAPP.

TO the limited number of published * cases in which the visual organ was permanently injured by quinine, I can add three from my own practice.

CASE I.—On February 16, 1878, the 7-year-old daughter of M. L., of New York, was brought to my office for impairment of vision. I learned from the mother that the child, three months previously, had suddenly been taken sick in the afternoon with high fever, nausea, vomiting, restlessness, but without spasms. She frequently groaned, and was delirious for 24 hours. She was treated for malaria by Drs. Simmons and Whitall, and took a great deal of quinine. On the sixth day she became hard of hearing, and for four days could not see any thing, and the pupils were immovable. On the tenth day she saw the fire in the grate. After that her sight slowly improved. She recovered from her general disease in two weeks, but her sight had remained weak, and she felt uncertain in walking.

When she presented herself to me, she was in good general health. She read easily Sn xx at 20′, and 0.25 at 8″ with each eye, but showed a moderate concentric limitation of the visual field in each eye. Her color-perception was normal. The ophthalmoscope showed a striking picture: both optic discs white, the retinal vessels scant and very small, especially the ar-

* The literature on the subject will be found in the papers on this subject by ROOSA, these ARCHIVES, vol. viii, p. 392, etc.; vol. ix, pp. 41–44; and *idem*, pp. 81 and 82; and by GRÜNING, this vol., p. 81. To this has to be added the case of Dr. MICHEL, a notice of which is contained on page 103, and a full report on page 214 of this volume. The full report was kindly furnished by the author on solicitation from the writer of the present paper.

teries. The pupils were of normal size and mobility, the eyeballs of normal tension, showing nothing unusual in external appearance and mobility.

From the marked atrophic appearance of the optic nerves, I thought that I had before me one of those cases in which a cerebral disease (in particular, meningitis) leaves the ophthalmoscopic picture of optic-nerve atrophy, though the vision is more or less restored. One symptom, however, the smallness of the retinal blood-vessels, did not support my supposition, for the retinal blood-vessels in cases of optic-nerve atrophy from cerebral disease are not so conspicuously small as they were in this instance; they may, it is true, be considerably reduced in calibre at first, but gradually they become thicker, so as to reach about three-fourths of the natural size. In this case, however, they remained far behind that thickness, and as the general disease had lasted only two weeks, and there was no intra-ocular affection to account for the atrophy of the blood-vessels, I asked Dr. Whitall about the particulars of her general disease and its treatment.

The doctor, on February 23, 1878, kindly sent me the following "abstract from his note-book," with permission to "make free use of it:"

"On April 12, 1877, saw Jennie L., æt. 6, with Dr. Simmons. Patient taken on afternoon of 3d with chill (not very severe), and pain in right hypochondrium, followed by fever and sweating. Fever has continued, with a slight abatement this A.M. It is now (5 P.M) intense, and the patient lethargic, *subsultus tendinum*. Pulse 150, regular; temperature (in rectum), 106¼° F.; pupils, moderately dilated and responsive to light. Profuse perspiration; slight hacking cough; lungs healthy.

"Urine (retained) drawn by catheter (8 oz.), no alb., healthy in appearance; vomiting. Ordered bath (70°), and quin. sulph., grs. x, by rectum. At 9 P.M., pulse, 150; temperature, 104⅞°; more comfortable; bath repeated. Quin., gr. ij, every hour by mouth.

"*April 5th.*—Quin. by mouth having been rejected, has been taking it by suppository (gr. x every 4 hours nearly). 10.30 A. M.,

pulse, 141; temperature, 105½°. 4 P.M., pulse, 140: temperature, 106°; after bath, temperature, 102¾°.

"*April 6th.*—Took 10 gr. quin. by enema last night. At 10 A.M. slightly delirious; bowels sluggish; vomiting; urination normal. Ordered hg. chlor. mit., gr. ij every hour till bowels moved; iced milk. Quin. (gr. x, by rectum) to be given at noon. 4 P.M., restless; pulse, 99, regular; temperature, 101°; pupils widely dilated, regular, immovable; cannot see; does not respond when spoken to, which Dr. S. and I regard as an effect of the quinine (deafness).

"10 P.M., sleeping quietly; pulse, 94, regular, and of good volume. Slept from 5 till 7, and from 8 till present. Suspended medication till morning.

"*April 7th.*—Restless night; singing and striking at attendants. Is now (10 A.M.) quite restless, though conscious; answers tolerably well; swallows well; pulse, 120, regular; temperature, 104¼°; pupils moderately dilated; *respond to light slightly.* To take 5 gr. quinine every 3 hours by rectum, with ¼ gr. codeine. 4 P.M., pulse, 120; temperature, 105°. Has taken nourishment at frequent intervals; bowels have moved freely and naturally; urination normal. Has been sleeping some. Bath, after which temperature 103½. 10 P.M., relish for food; asked for bread and milk; pulse, 120; temperature, 104¾°. Still amaurotic, somewhat excitable, but usually rational; urine heavily loaded with urates.

"*April 8th.*—Comfortable night; amaurosis unchanged; pupils regular, moderately dilated, respond slightly; tongue slightly coated and brownish. Imagines she is in an hotel at Long Branch; otherwise rational. Appetite good; pulse, 114; temperature, 104¾°.

"*April 9th.*—Condition in general as yesterday. Complained of slight pain over right eye. Has been taking 4 grains tannate of quin. every 2 hours. 10 P.M., pulse, 120; temperature, 105½°.

"*April 10th,* 10 P.M.—Sleeping quietly most of the day. Pulse, 117; temperature, 103¾° (1½ hours after bath); bowels and kidneys acting well; perfectly conscious; appetite excellent; tongue moist and not much coated; free from pain. Amaurosis complete; pupils dilated, do not respond; hearing not impaired. Slight tenderness over spleen upon deep pressure, but no apparent enlargement.

"From this time onward the patient made a steady improvement (no quinine given after the 10th). On the afternoon of 11th saw

sparks of fire from the grate. On the 12th could count fingers. Left the case with Dr. S.

"I see by your letter that you think the child had meningitis, and right here, in my judgment, lies the interest of the case. The question with me was between *malaria* and meningitis; but after carefully weighing the matter, I decided in favor of the former, though, I confess, the picture of the disease in its totality is as much opposed to one as the other. The result of your examination of the eyes again unsettles me. I was forced to reject the diagnosis of meningitis because of the absence of *pain* (with one uncertain exception late in the disease), the absence of retraction of head, of opisthotonos, of eruptions, of hyperæsthesia or anæsthesia, of spasm or paralysis, of any inequality of pupils or irregularity of the pulse, and because of the effect of quinine upon the general condition. Dr. S. and myself were satisfied that while the fever was modified, and at last probably broken by it, the delirium and amaurosis (such cases have been reported) were caused by it."

As the general disease was cured long ago, and the eye showed no irritability and no symptoms of inflammation, I recommended no special treatment.

On May 11th, 1879, she presented herself to me again. Four months previously she had had malaria, and taken quinine again; no more, however, than ten grains one day. The parents had noticed that from that time her sight was impaired. I found S $\frac{20}{200}$ in the right, and $\frac{20}{100}$ in the left eye. She read 0.50 with difficulty. No improvement with glasses. She was green-blind. Her field of vision was very much contracted: in the right eye almost to the point of fixation, in the left having a diameter of 15°, of which 5° were on the nasal, 10° on the temporal side, from the point of fixation. The optic discs were white; the blood-vessels, especially the arteries, few and very small. Patient had frequently suffered from headache.

Bearing in mind Dr. Roosa's case, and having listened to the remarkable case of quinine poisoning which Dr. Voorhies related at the Atlanta meeting of the Am. Med. Ass. a few days previously,* I now had no doubt but that the ocular disease was to be referred to the influence of quinine. As Dr. Voorhies had given his patient nitrite of amyl by inhalation without any effect, and strychnia without apparent benefit, I ordered calomel in small

* See Transact. Am. Med. Ass., 1879, pp. 411–472, and p. 81, vol. ix of these ARCHIVES.

doses (half a centigram) three times daily. I cannot say that this remedy was of more use than the others which have been employed for this disease. The patient's sight improved slowly. Five weeks later I found in each eye S $\frac{20}{40}$, the visual fields still contracted, but less than before, namely 40° in diameter. In the year 1880 I saw her several times; the ophthalmoscopic picture was not changed. The arteries pulsated on pressure upon the globe. Her sight remained $\frac{20}{40}$; with $+\frac{1}{48}$ it was $\frac{20}{30}$. She read 0.25 at 6″ with some difficulty. Her fields of vision were still concentrically limited, though less than before.

In May, 1881, while preparing this paper, I examined her again. Her sight was $\frac{20}{20}$ in each eye. Emmetropia. She experienced no inconvenience from her eyes in any way. Her perception of colors, tested with different methods—selection of samples, pseudo-isochromatic plates, contrast-shadows—proved perfect. Her light-sense was normal. She never complained of seeing less in the dusk than other people, and was able to read the same type as persons with good eyes, when I gradually obscured the examination-room. Her field of vision, however, was still contracted, and, measured perimetrically, showed almost symmetrical figures in both eyes. The accompanying drawing refers to the right eye. The dotted line indicates the limit of the normal field of vision.

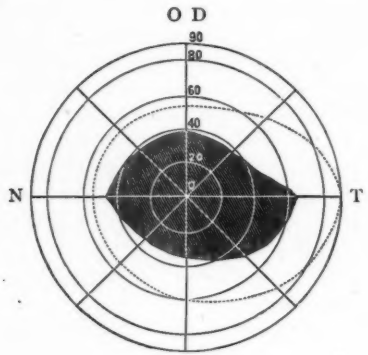


FIG. 1.

The limits of F were as follows:

	RIGHT EYE.	LEFT EYE.
Horizontally inward,	45°;	45°
45° upward and inward,	38°;	38°

	RIGHT EYE.	LEFT EYE.
Straight upward,	39°;	38°
45° upward and outward,	38°;	38°
Straight outward,	65°;	62°
45° downward and outward,	50°;	50°
Straight downward,	35°;	42°
45° downward and inward,	35°;	40°

The optic discs were white, with a faint pinkish tinge. Both arteries and veins were few and small, but none were white. The choroidal vessels, clearly visible, were normal in color, size, and distribution. The appearance of the fundus oculi, in general, was normal, with the exception of the changes of the optic disc and retinal vessels, as described above.

CASE 2.—J. R. P., æt. 7 years, of New York, consulted me Dec. 17, 1880. His mother gave the following history: He saw well until four years ago, when he had "a terrible malarial fever from sewer-gas." It began in the afternoon with coma. In the night he woke, burning hot, screamed, vomited, with twitchings of the muscles of his mouth and his whole body. After three days the fever subsided, and he felt better. Then the fever returned for two days, after which he gradually improved, but had high fever every afternoon at five o'clock. He became emaciated, and very pale. In two weeks he got out of bed, but was very feeble, and staggered.

Treatment. On the first day he had an enema, and took castor-oil. From the second day large doses of quinine every three hours for a whole week. In the second week he took one large dose every day before the attack. The pupils dilated. On the tenth day he did not see any thing; later he gradually and very slowly recovered his sight, but he has been awkward and stumbling ever since. He took quinine off and on later. For two years and a half nystagmus has been noticed.

Condition on examination. Vertical vibratory nystagmus. Periodic divergence of the right eye. Pupils move well. Optic discs white; vessels very small, some converted into white cords. S R $\frac{20}{100}$, L $\frac{20}{70}$. Recognizes colors correctly.

Field of vision in both eyes concentrically contracted: in the right eye to a diameter of 20°, in the left of 30°.

CASE 3.—Fred. P., æt $8\frac{1}{2}$, had, according to the mother's statement, cerebro-spinal meningitis when he was in his third year. This was a year after the time when his brother, the patient of

the preceding case, had the "terrible malarial fever from sewer gas." He took a great deal of quinine, more than his brother. When at the end of two weeks he came out of his stupor, he could not see anything, not even a bright light held before his eyes. If different objects were moved to and fro, or up and down near him, he neither shrank from them nor followed them with his eyes. After some weeks he began to see a bright light, and very slowly recovered his sight, his eyes remaining weak for some years.

When I examined him, Dec. 18, 1880, I found his optic nerves pale, the left more so than the right, undoubtedly atrophic-looking. The retinal blood-vessels were abnormally small, but much less so than in his brother's eyes. He was myopic, and read with $-\frac{1}{18}$ Sn LXX at 20′, and 0.50 near by, with each eye. His visual fields were moderately contracted, and had the shape of a horizontal ellipse.

On *June* 8, 1881, his father brought him to me again for examination. He stated that the disease began with malarial fever, the same as his brother. T. 105°. Was delirious and unconscious for two weeks. Head drawn back, gnashing of his teeth, and spasms in different parts of his body. From the second day he took as much quinine as his stomach would bear, and when it was rejected, it was given by subcutaneous injection and per rectum. After two weeks the fever had subsided, but he was sick and feeble for six weeks. I found the ophthalmoscopic condition unchanged. With $-\frac{1}{18}-\frac{1}{36}$ C axis 0° (horizontal) S was $\frac{20}{60}$ in each eye. Near by he read 0.50 without glasses, not essentially better with

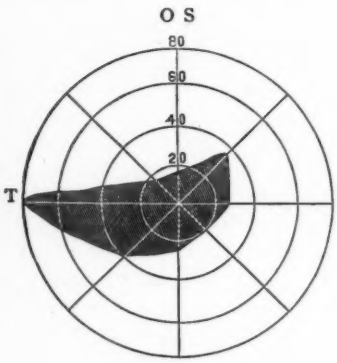


FIG. 3.

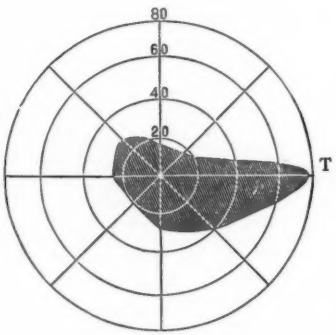


FIG. 2.

cylinders. His light-sense was normal, his color-sense, tested with Holmgren's worsteds, Snellen's chart, and Stilling's plates, proved normal too; but he had some difficulty in recognizing contrast-shadows, and called the yellow shadow from a blue glass, brown. His visual fields, measured perimetrically, showed symmetrical figures (see diagrams, figs. 2 and 3), the dimensions of which were as follows:

	RIGHT EYE.	LEFT EYE.
Horizontally inward,	29°;	24°
45° upward and inward,	28°;	35°
Straight upward,	18°;	15°
45° upward and outward,	19°;	18°
Horizontally outward,	75°;	80°
45° downward and outward,	40°;	40°
Straight downward,	30°;	24°
45° inward and downward,	20°;	20°

The three cases here reported may, I think, without a strain, be referred to quinine poisoning, as they show all the characteristic features of this affection, mentioned in the cases of Roosa, Wecker, Voorhies, Michel, and Grüning, namely:

1. Total blindness subsequent to the taking of large quantities of quinine.
2. Pallor of the optic discs.
3. Marked diminution of the retinal blood-vessels in number and calibre.
4. Contraction of the visual field.

The *total blindness*, in all the cases thus far made known, was only temporary.

The *restoration of the central acuteness of vision was complete* in the first case of Roosa, in the cases of Wecker, Grüning, and Michel, the first case described in this paper, and, perhaps, in the case of Voorhies (patient read Jäger No. 1).

It was incomplete in the second case of Roosa, S $\frac{20}{40}$ in each eye; in Cases 2 and 3 of this paper, namely: in Case 2, $\frac{20}{100}$ in the right, $\frac{20}{70}$ in the left eye; in Case 3, $\frac{20}{50}$ in each eye. Wecker states*: "In these rare cases, as far as my experience goes, vision has returned incompletely, and I have never seen absolute blindness caused."

* Quoted by Roosa. These ARCH., ix, p. 82.

The case of Baumgarten is known to me only from Dr. Burnett's abstract, which* reads as follows: "Dr. B. reported the case of a boy who lost sight and hearing after taking what was estimated to be five drachms of quinia. He re-recovered in about six weeks."

As *ophthalmoscopic appearances* are mentioned, in all well-characterized cases, *pallor of the optic disc* and *scarcity and smallness of the retinal blood-vessels.* In the majority the principal vessels still contained blood; in Voorhies' case, which is the most advanced of all, "the disc, a week after the poisoning, was perfectly white, and there was not a trace of optic-nerve vessels." Fifteen months later "the disc was perfectly white, with still no trace of central artery except a small twig, which is just perceptible as it struggles over the upper half of the disc of the left eye, to be lost on reaching the retina." In the first case of the present writer some of the vessels were transformed into white cords. In the third case the discs, five years after the poisoning, were unmistakably atrophic-looking, but the retinal vessels only moderately smaller than natural.

Dr. Grüning, who saw his patient 24 hours after the onset of the blindness, noticed, "*at the macula of each eye, a cherry-colored spot, surrounded by a zone of bluish-gray opacity,*" which, nine days later, had disappeared.

Dr. Voorhies found, a week after the poisoning, "*the choroidal vessels empty, with pale-yellowish tinge of retina.*"

The *contraction of the visual field* is likewise mentioned in all cases. It is at first extreme, and expands but slowly, yet there is no well-marked case on record in which F regained its natural extent. Among the cases in which F was perimetrically determined, our second case seems to exhibit the greatest permanent contraction, namely 20° in diameter in the right, and 30° in the left eye. The contraction is concentrical or elliptical with the longest axis in the horizontal direction (see the charts by Roosa, Grüning, Michel, and in this paper), only Wecker mentions in his case, "the visual field of each eye showed a peculiar symmetrical lacuna. There were in both visual fields, islands

* This vol., p. 103.

of blindness; the larger of the two occupied a considerable portion of the internal half of the field, and extended somewhat beyond the point of fixation; the smaller occupied only a small external portion."

Other symptoms, which are mentioned in the well-marked cases, and seem to be more or less constant, are the following:

1. *Diminution of the color-sense.* At first there seems to be total color-blindness, then only red-green blindness, then only green and gray are not correctly recognized, and at last the color-perception is completely restored.

2. *Diminution of the light-sense.* Roosa's second patient "felt (two years after the poisoning) as if a veil was over her eyes. Cannot tell whether her linen is clean when it comes from the wash." Her color-sense also was diminished. Dr. Grüning's patient, whom I had an opportunity to examine at my office on Feb. 9, 1881, which was seven months after the poisoning, stated that her principal complaint was a general cloudiness of the atmosphere, and a gray misty appearance of objects. This darkness had formerly been more distressing, and was still gradually diminishing. Her color-perception was yet imperfect. I omitted to test her sharpness of sight and color-perception by varying intensity of illumination. In the cases reported in this paper I made these tests, two, four and five years respectively after the poisoning, and found the color- and the light-sense normal.

3. *The pupils, during the total blindness, are irresponsive to light*, but (Grüning) move on accommodative efforts. Gradually they regain their normal reactive mobility.

4. *Anæsthesia of the cornea* is mentioned only by Voorhies.

5. *Impairment of hearing*, to total deafness, and *tinnitus aurium*, seem to be present in every case, though transient; the total deafness lasting only 24 hours, then it gradually disappears together with the noises.

The two cases which A. v. Graefe related in his *Archives*, iii, 2, p. 396, etc., 1857, are not typical, though I think they are true examples of quinine amblyopia. In the first, after the consumption of six drachms of quinine within a fortnight, there occurred violent tinnitus aurium, deafness, mod-

erate amblyopia in the left eye, and almost total blindness in the right. Four months later, Graefe found the amblyopia of the right eye still existing, the visual field, and the ophthalmoscopic condition in both eyes normal. Further history unknown.

Graefe's second patient took about fifteen grains of quinine daily for a long time, altogether almost an ounce. At a time when he increased the daily doses to twenty-two grains, he had tinnitus aurium, inconsiderable hardness of hearing, and weakness of sight in the right eye, increasing, in a few days, to total blindness. Three months later, Graefe found the blindness of the right eye still complete; the left eye was perfect; ophthalmoscopic condition in both normal. Graefe treated him with Heurteloup's leech. Each application was followed by an appreciable improvement. After the first, the patient had faint perception of light in the whole field of vision; after the third, he recognized the movements of the hand in the whole F. Later, he read fine type with ease.

What, in Graefe's cases, is most at variance with the more recently published observations, is the absence of ophthalmoscopic changes, and the completeness of the visual field, both of which conditions he distinctly states. The clinical histories and the blindness and deafness were, however, characteristic enough to accept his diagnosis. I think he had incompletely-developed, that is, mild cases, before him, and this leads us to a very important practical question, viz.: How frequently, and in what degree, does quinine affect the auditory and visual organs? Which symptoms are transient and which permanent?

Though well-observed cases of quinine amaurosis have been described only of late years, their occurrence is mentioned by many authors. Dr. Simmons, in discussing with me the first case reported in this paper, showed me a passage in the "Forensic Medicine and Toxicology," by Woodman & Tidy, p. 268, Phil. edition, 1877, which reads as follows: "Dr. Baldwin (*Med. Times & Gaz.*, July 10, 1847, p. 397) states that he has seen blindness, convulsions, and death result from quinine, and he regards 60 to 80 grains as a poisonous dose. In the tropics as much as 120 grains have

been given without bad effects." In the cases of quinine amaurosis the quantity taken could not always be estimated. It varied from 80 grains in thirty hours, to 1,300 grains within three days. Our first case seems to demonstrate the important fact that relapses occur, and are brought about by comparatively insignificant doses; viz.: two grains every two hours, taken only one day, and that in these relapses the recovery is slower than in the first attack.

The subjective noises and deafness, though exceedingly frequent symptoms of quinism, are always transient; I, at least, have not been able to trace one case of persistent tinnitus aurium to the use of quinine alone. The impairment of sight will, I suppose, disappear entirely in the mild cases, whereas, in the severe typical ones, the restoration of the central acuteness of vision seems to be complete only in a certain number of cases; in almost all, however, a fair amount, $\frac{20}{200}$ to $\frac{20}{30}$, of S is regained. The contracted visual field expands slowly, commonly does not reach its natural limits again.

The *prognosis* of quinine amaurosis, even in advanced cases, is, on the whole, good, as there is, thus far, no case of permanent blindness on record, and the typical, *i. e.*, fully developed cases are very rare. How frequent the mild cases are, and how rapidly they recover, remains for further observations to ascertain.

No beneficial mode of *treatment* seems yet to have been discovered. The "depletory therapy" to which v. Graefe ascribes the recovery in his second case, will, in view of the marked ischæmia of the retina discovered of late, scarcely find any advocates now. Nitrite of amyl, given in the way of inhalation, by Voorhies, Grüning, and Michel, showed no effect. Strychnia and other remedies, as well as electricity, were likewise inefficient. Horizontal position, as long as the general anæmia and particularly that of the brain and eye, are marked, seems beneficial. Generous diet, with perhaps gentle stimulants, and, as soon as practicable, sojourn and exercise in a healthy, invigorating atmosphere, appear rational means of recovering strength and supplying the retina with what it most needs—blood.

AN ABSTRACT OF THE PAPERS ON OPHTHALMOLOGY.

READ BEFORE THE SECTION OF OPHTHALMOLOGY, OTOLOGY, AND LARYNGOLOGY AT THE 32D SESSION OF THE AMERICAN MEDICAL ASSOCIATION, HELD AT RICHMOND, VA., MAY 3, 4, 5, AND 6, 1881.

By SWAN M. BURNETT, Washington.

A registering perimeter. By Dr. G. T. Stevens, of N. Y.—Fixed to a standard is a ring of brass about five inches in diameter in which is held another ring which is movable. To the inner (movable) ring is attached a series of wheels, a rack carrying a pencil, and a bearing through which passes an arm of thin brass about 25 inches in length. This arm is bent so as to form an arc of a circle of 12 inches radius. One edge of the arm is toothed. At one extremity of the arm is a dark plate on which is fixed a small piece of white or colored cardboard. The arm, owing to the movement of the inner ring, to which it is held by the bearing, can be set at any angle to the horizon; by turning with the ring it describes in space a hemisphere, and as it moves in a circle the inner ring with its attachments moves with it. In front, a dark disk of sufficient size hides the working portions of the instrument from the eye of the examiner. A small polished point at the centre of this disk serves as a point of fixation.

When the arm has been pushed along until the small bit of cardboard touches the polished point on the disk, the toothed edge of the arm has caused the rack bearing the pencil to have also moved in such manner that the pencil is just opposite the point of fixation. When the arm is moved so as to carry the bit of cardboard through a space of 100 degrees, the pencil has been carried as far as the outer edge of the outer ring. It will be seen

that the pencil not only moves in a circle directed by the position of the arm to the horizon, but also at different distances in the circle depending upon the position of the arm in its bearing. The movement of the arm in its bearing is communicated by a milled head turned by the fingers. By a hinge a tablet is attached to the upright support. On this tablet a printed diagram may be so placed that when the diagram is brought in contact with the pencil the centre of the diagram is opposite the point of fixation. As the paper touches the pencil the exact position of the pencil is registered upon the diagram.

The instrument is made by Foucault, of Albany, and its cost is about $40.

Dr. CHISOLM, of Baltimore, read a paper on *the actual cautery needle in the treatment of conical cornea.* Guided by a suggestion made by Gayet, Dr. C. tried this method on a very unpromising case of keratoconus in a patient affected with exophthalmic goitre. Fingers could be counted at 1 foot only before the operation; after the operation, at 6 feet, with a prospect of improvement by an iridectomy. The operation is performed with a fine sewing needle heated to whiteness in an alcohol lamp, and thrust through the apex of the cone. The subsequent cicatrization causes a flattening of the cone.

Dr. CHISOLM also exhibited a needle designed for the *destruction of the hair-bulbs*, in case of displaced cilia, by *electrolysis.* It consists of a needle set into a handle, which is introduced cold into the root of the hair-bulb. By pressing on a button, connection is made, and the needle becomes heated, and the electrolytic action is manifest by the bubbles of gas escaping.

Dr. E. SMITH, of Detroit, Mich., reported a case of *blepharoplasty without a pedicle.* There was strong ectropion of the upper left eyelid, the result of phlegmonous erysipelas. The edge of the lid was detached from its adherence to the brow and united by sutures to the edge of the lower lid. A piece of skin (about ⅓ larger than the open wound), 1½ by 2 inches, was taken from the arm, and all the subcutaneous tissue and even a small layer of the true skin were shaved off. It was applied to the wound and united by four sutures.

The case did well, and now, more than 6 months after the operation, the graft has not shrunken more than one-half, and has not diminished any for some time past. In one other instance S. failed, because, he thought, he had not cleaned the graft sufficiently from subcutaneous tissue.

The Chairman (Dr. REYNOLDS of Louisville), made some remarks on *astigmatism*, particularly with reference to the best method for its detection and the correction of low degrees. He had found the use of Snellen's test types the most reliable of any of the means for determining the kind and degree of astigmatism, and he had often found it necessary to correct an astigmatism as low as $\frac{1}{64}$. He referred to a class of cases, an example of which was found in his own eyes, where a simple h. astg. when corrected did not give the patient relief, but where its conversion into a hypermetropia by a concave cylinder, did. He had a h. astg. of $\frac{1}{20}$ with the axis in an oblique direction, and he found that he had most comfort for distant vision and also for near work when it was not continuous with a$-\frac{1}{24}$, having its axis at right angles to the axis of the hypermetropic meridian. This was a clinical fact which he had seen demonstrated in other individuals than himself, and he could account for it in no way except that in such instances the accommodative power had become athletic.

Dr. RISLEY had also frequently found it necessary to correct very low degrees of astigmatism.

Dr. BURNETT had in one case corrected a h. astg. of 0.25 D with complete relief to a most aggravated asthenopia. The patient was, however, prostrated from overwork. He was of the opinion that the correction of low degrees of astigmatism would be found to be most beneficial in those cases where the nervous system was overstrained.

Dr. H. A. WILSON, of Philadelphia, showed some *compressed pellets* of atropine and sulphate of sodium ($\frac{1}{100}$ gr. atropine, and 3 grs. sulphate of sodium), which he had found useful in ophthalmic practice. One was to be placed in the lower cul-de-sac and in about two minutes it was absorbed. They were neat and convenient, and particularly useful in paralyzing the accommodation for determining refraction.

ABSTRACT OF AMERICAN OPHTHALMOLOGICAL LITERATURE DURING THE FIRST QUARTER OF THE YEAR 1881.

By Dr. SWAN M. BURNETT, Washington.

1. J. A. White. **Ophthamological notes.** *Va. Med. Monthly*, Oct., 1880.

(1.) Duboisia in eye diseases, with a case of intoxication from the local application to the eyes.

(2.) Jaborandi and pilocarpine in eye diseases. Cases of white atrophy of the optic nerve, chronic neuro-retinitis, hemorrhage, and opacities in the vitreous, are related, in which benefit was found from the use of jaborandi, or its active principle pilocarpine given internally or by hypodermic injection.

2. H. M. Bannister. **On some points in regard to color-blindness.** *Jnl. of Nervous and Mental Diseases*, Jan.

B. takes the same position as the reviewer in his article in the last number of these Archives, viz.: that the cause of some cases of color-blindness is to be found in the brain-centre and not in the retina; and thinks that the defect in color-sense can be improved by exercise. He thinks Holmgren's test tends to magnify slight defects in the color-sense, and that more than one method of examination should be used where we want extreme accuracy.

3. S. D. Risley. **The sulphate of hyoscyamia as a mydriatic.** *Phila. Med. Times*, Feb. 26.

R. has used this mydriatic in eight cases, and finds that it is powerful in its action, and more like duboisia in the rapidity of its effects than atropine. He used a 2-grain solution.

4. James L. Minor. **A review of three anomalous cases of glaucoma.** *N. Y. Med. Jnl.*, Feb.

In the first case the glaucomatous condition followed the instillation of atropine in a case of circumscribed ulcer of the cornea. In the second, the lens had been dislocated into the anterior chamber three months previously. On instilling eserine glaucoma supervened. In the third, a Gräfe extraction of cataract had been done, and a cystoid scar remained. Increased T. followed, which was relieved by a second iridectomy.

5. W. F. Little. **Homatropine hydrobromate; is it a powerful mydriatic?** *Phila. Med. Times*, Feb. 26.

L. has come to the conclusion, from his experience, that the homatropine hydrobromate is not so reliable in its action as atropine.

6. M. LANDESBERG. Case of **acute glaucoma in a child** of 8 years, cured by **sclerotomy,** with an additional account of **nine sclerotomies** performed for glaucoma **in adults.** *Med. & Surg. Rep.*, Feb. 26.

As the outcome of his experience, L. has arrived at the conclusion that the operation of sclerotomy should supplant iridectomy in, (1,) absolute glaucoma, (2,) secondary glaucoma, and glaucoma-like conditions of the eye, and (3,) in cases of glaucoma where irridectomy has already been tried, but the process has returned.

7. WM. THOMSON. Two cases of **optico-ciliary neurotomy.** *Med. & Surg. Rep.*, March 19.

The immediate results, in both cases, as regards the alleviation of the symp. ophthalmia in the fellow-eye, were good.

8. W. W. SEELY. **Prevention of the irritating effects of atropia.** *Cin. Lancet & Clinic*, March 26.

S., in addition to some mild astringent (usually zinc), has used the yellow oxide of mercury ointment as a controller of the irritating effects of atropine.

9. HENRY W. BRADFORD. The **electro-magnet** in ophthalmology, with the description of **a new instrument.** *Bost. Med. & Surg. Jnl.*, March 31.

B. describes his instrument as follows: "The core is composed of soft Norway iron, one-third of an inch in diameter, and two and one half inches in length; to one end of this solid cylinder is riveted a flat circular disc of the same material, one inch in diameter, and one-sixteenth inch thick.

"The surrounding helix is composed of insulated copper wires, weighing twenty-nine grains to the foot, making eight convolutions of one and three quarters inch in length.

"The polar extensions are respectively five, four, and three thirty-seconds of an inch in diameter, and one half inch in length; their suspensive power equals twenty, sixteen, and eleven ounces each, when an armature of soft iron, one inch by one tenth in diameter is used, which is within two ounces of the saturation point.

"The battery used is a single bichromate of potash cell, having eight square inches of negative surface. The magnet weighs about five ounces, and the intensity of its field by the addition of another cell is made as great as that of a magnet capable of lifting a ton."

Four cases are given in which the instrument has been successfully used in the extraction of foreign bodies from the interior of the eye.

10. C. S. BULL. A contribution to the pathology of **orbital tumors:** being a study of the secondary processes in the periosteum and bones of the orbit and vicinity. *N. Y. Med. Jnl.*, March.

Case 1.—Encapsulated orbital sarcoma; extirpation; return of the growth as a myxo-sarcoma; infiltration of all the bones of the orbit, and of the facial bones of the left side in general; three operations for the removal of the tumor.

Case 2.—Intra-ocular sarcomca; secondary infiltration of the optic nerve and orbit; degeneration of the orbit and face; four operations for the removal of the growth.

Case 3.—Fibro-sarcoma of the orbit, involving the periosteal lining, and, subsequently, the bones of the orbit and face.

B. concludes from a study of those cases that such growths are not fit subjects for operative interference.

11. DAVID WEBSTER. **Sympathetic neuro-retinitis.** *N. Y. Med. Record*, March 5th.

W. records two cases of sympathetic neuro-retinitis—one from a shrunken eye, lost by traumatic injury ; the other, from symblepharon.

12. J. C. DALTON. **Centres of vision** in the cerebral hemispheres. *N. Y. Med. Record*, March 26th.

From experiments performed on dogs, D. feels justified in concluding: "1. Extirpation of the angular convolution causes loss of visual perception on the opposite side. 2. This operation is not followed by any disturbance of the intelligence, attitude, power of locomotion, or general sensibility. 3. It does not interfere with the local sensibility of the retina or conjunctiva, the reaction of the pupil to light, nor with the normal consentaneous movements of winking. Its effects are, therefore, confined to the exercise of visual sensibility."

13. EDWARD T. ELY. A successful case of **transplantation of the skin** according to Wolfe's method. *N. Y. Med. Jour.*, March 12th.

The lower eyelid (which was cicatricial) was adherent to the lower part of the cornea. The upper part of the cornea was clear. The lid was separated from the globe, so as to restore the normal space, and a piece of skin, 1 inch long and $\frac{3}{4}$ inch wide, was taken from the forearm and applied to the now inner surface of the lid, and kept in its place by a few sutures. The graft united by first intention with only a small bit of sloughing at one end. A previous effort on another patient was not successful.

14. J. P. WALL. **Congenital absence of the eyeballs.** *N. Y. Med. Record*, March 26th.

The tutamina oculi were perfectly formed, but there were no eyeballs even in a rudimentary form. The lachrymal gland was present. The child was a white male and six months old.

15. E. G. LORING. **Conjunctivitis from impure dust from the streets.** *N. Y. Med. Record*, April 9th.

L. gives a graphic picture of a conjunctival disease now prevalent in New York City, which corresponds to what we call hyperæmia of the conjunctiva. One of its chief characteristics is its intractableness.

He considers the present extreme prevalence of the affection in New York City due to the dust from its very dirty streets acting as a local irritant. In the treatment of such cases he has found a solution of nit. argt. $\frac{1}{8}$ gr. to $\frac{\mathfrak{z}}{\mathfrak{z}}$ i aq. of more service than any other local application.

16. E. S. PECK. **Sympathetic ophthalmia due to symblepharon.** *N. Y. Med. Record*, April 16th.

P. relates a case in which irido-choroiditis was the sympathetic manifestation of a symblepharon in the shrunken fellow-eye. The trouble was ameliorated after a release of the symblepharon.

17. C. S. BULL. Some points in the **pathology of ocular lesions of cerebral and spinal syphilis.** *Amer. Jour. Med. Sciences*, April.

B., after more general considerations of the subject, relates five cases bearing on the subject :

CASE 1.—Paresis of the left superior rectus; transient and recurrent ptosis; paraplegia; atrophy of the optic nerves following neuritis.

CASE 2.—Paralysis of the right third nerve, and right superior oblique; subsequent simple white atrophy of the optic nerves.

CASE 3.—Optic neuritis ending in atrophy of the right optic nerve.

CASE 4.—Ptosis of left side. Bilateral optic neuritis.

CASE 5.—Paralysis of right inferior rectus; right ptosis; deafness complete on one side, partial on the other; atrophy of right optic nerve.

18. W. C. AYERS. The **physiology of the visual purple.** *N. Y. Med. Jour.*, May.

A. sums up his conclusions as follows: "We know that the purple is a photochemical substance which is sensitive to light, and that its seat is in the outer segments of the rods, whereas it is never found in the cones. The cones, on the other hand, being the only elements found in the fovea centralis, we are forced to the conclusion that distinct vision, both for objects and for colors, is independent of its existence. In the higher classes of animals, it is sensitive to light, but in some deep-sea fishes, cephalopods, etc., it has its seat in the rods, but is no longer sensitive to light, although it has the same color as before. In another variety of fishes, the black fish, for example, it is purple in color, but resides in the slender offshoots of the pigment cells, which run in between the rods and cones. Where it is not sensitive to light, the optical structure of the eye is very defective, and any benefit of a sensitive compound would not be appreciated, and it therefore does its work on a stable pigment. It is an albuminoid compound, and is a secretion of the pigment epithelial cells of the retina; but this secretion is not controlled by any one of the larger nerve trunks, which have a part to play in the functions of the eye. We know of no drug which can diminish its secretion, but pilocarpine and muscarine greatly increase it."

REPORT ON THE PROGRESS OF OPHTHALMOLOGY FOR THE FIRST HALF OF THE YEAR 1880.

By Dr. H. MAGNUS, of Breslau, and Dr. A. NIEDEN, of Bochum.

Translated by Dr. R. O. Born, of New York.

PATHOLOGICAL ANATOMY, SPECIAL PATHOLOGY, AND LITERATURE.

By A. NIEDEN.

IV.—PATHOLOGICAL ANATOMY.

147. Baumgarten, P. The tubular glands and the lymph-follicles in the human palpebral conjunctiva. *A. f. O.*, vol. xxvi, 1, p. 122. He **opposes the theory of a specific inflammation in trachoma** by demonstrating the existence of follicular formations in the human conjunctiva, and interprets the follicles as chronic inflammatory hyperplasias of the tubular glands. Comp., p. 108, this vol.

148. Beauregard. **Suppuration of the vitreous.** The pus-cells come from the cells of the choroid. *Soc. de Biol.*, Paris, June 12, 1880. *Progrès Méd.*, p. 492.

149. Bull, C. S. Intra- and extra-orbital fibro-sarcoma. *Med. Record*, vol. xvii, No. 10, p. 518.

150. Bull, C. S. Intra- and extra-ocular sarcomata of choroid and optic nerve. *New York Med. Journ.*, vol. xxxi, No. 3, p. 301.

151. Cohnheim. **Tuberculosis** from the **standpoint of the doctrine of infection.** *Faculty programme*, Leipzic, 1879. *C. f. M. W.*, 1880, 199 p. The experimental infection of the iris with a tuberculous substance is always followed by general infection of the body; the possibility of inoculation, therefore, can be used as a diagnostic sign of tuberculous products.

152. Dreschfeld (Manchester). Practical anatomical contributions to the **semidecussation of the optic nerve fibres.** *C. f. A.*, Febr., p. 33. Two cases. In the first case the symptoms were, in the beginning, those of

diabetes insipidus, later of a tumor of the right basis cranii. Paralysis of all the external muscles of the right globe, with amaurosis and total left-sided temporal hemianopsia with normal acuteness of vision. The autopsy showed: carcinoma of the dura mater, beginning at the right foramen lacerum medium and extending to the right optic foramen. Left side of chiasm perfectly intact, 2d, 3d, 4th, 5th, and 6th cerebral nerves partially destroyed.

In the second case there was left-sided hemiplegia with total and absolute hemianopsia, with subsequent bulbar paralysis. The *post-mortem* examination revealed a large tubercular tumor which had destroyed the right optic thalamus almost completely, extended to the nucleus lentis, approached near to the lower surface of the right hemisphere, and had flattened the right optic tract. The tumor contained numerous giant-cells surrounded by round cells.

153. FUCHS. Tuberculosis by inoculation. Experimental researches. *C. f. A.*, 1880, p. 203.

154. HOCQUARD, E. Anatomie et physiol. pathol. des staphylômes. *Annal. d'Ocul.*, vol. lxxxiii, p. 41 and 215. The author distinguishes **conical** and **spherical staphylomata.** The former are caused by thinning of the centre of the cornea, diminution of the corneal curvature at the periphery, and stretching of the sclerotic at the corneal junction and the ligamentum pectinatum. In the spherical staphyloma the centre of the cornea becomes expanded, the periphery is pressed back, folded over at the corneal margin like a joint, and almost lies upon the sclerotic.

155. HOWE, J. W. Postocular tumor. Extirpation of eye. *N. Y. Pathol. Soc.*, Apr. 14. *Med. Record*, vol. xvii, 10, p. 517.

156. KNIES, M. **Argyria oculi.** *Z. M.*, vol. xviii, p. 165. After external application of the nitrate of silver stick for 50 years, K. observed two modes of staining of the tissues, one being diffused, the other consisting of minute granules. The cornea was stained brown, especially in the centre. The epithelium and the endothelium of Descemet's membrane were free. The subconjunctival tissue was, in its whole extent, pervaded by lymph spaces which were densely filled with granules of silver. In transverse sections, the blood-vessels were surrounded by black rings, the adventitia being densely filled with granules. The author concludes from this that there is a centrifugal current of fluid in the cornea which has its exit, partly at the sclero-corneal margin, to the lymph-vessels of the transition fold, partly to the outer surface of the sclerotic and Tenon's capsule, and further back into the orbital tissue.

157. KNIES, M. **Cancroid at the sclero-corneal margin,** a large growth, with cells double the size of normal epithelial cells, and with considerable cellular infiltration of the connective tissue. Probably a cancroid in the initial stage. *Z. M.*, vol. xviii, p. 178.

158. KNIES, M. **Cataracta polaris anterior** in a child three weeks old, after perforating ulcer of cornea. Immediately upon the capsule concentrically arranged spindle-shaped cells with elongated nuclei. *Z. M.*, vol. xviii, p. 181.

159. KNIES, M. **Cataracta Morgagni** with marked proliferation of large round, partly nucleated, partly non-nucleated formations at the equator of the lens, as they are observed in the so-called peripheric annular thickening (Krystallwulst) after extractions. *Z. M.*, vol. xviii, p. 182.

160. MANFRED (Modena). Esame anatomico di un piccolo settore di **neo-**

plasia iridocigliare e consid. critiche per lo relativo diagnosi di tuberculosi primitiva dell' iride. *A. di Ott.*, vol. ix, 1, p. 75.

The author proves anatomically the correctness of his idea that the granulomata of the iris have to be taken as tubercles.

161. MANZ. Two cases of **congenital microphthalmus** with remarks on cystoid degeneration of the fœtal globe. *A. f. O.*, vol. xxvi, 1, p. 154. He found in the lower portions of both globes cystoid tumors, and he thinks that congenital hydrophthalmus is principally caused by chronic inflammatory processes in the uveal tract. In this form, the anterior and posterior chambers of the eye become enlarged; in the other forms of congenital cystoid degeneration, the enlargement is one-sided, confined to a portion of the walls of the eye, whilst the remainder of the eye atrophies by compression or by impaired nutrition and circulation, which cause intra-ocular hemorrhages.

162. PANAS and REMY. **Anat. pathologique de l'œil,** Paris, *Delahaye & Co.*, 1879. It contains anats-pathol. contributions on chalazion, conjunct. melano-sarcoma, ossification of the lens, nine cases of irido-choroiditis, two cases of melano-sarcoma of the choroid, hæmorrhagic glaucoma, angioma of the choroid, choroidal tuberculosis, two cases of albuminuric retinitis, cystoid detachment of the retina, double optic neuritis in cerebral syphiloma, and atrophy of the optic nerve in sarcoma of the brain.

163. SAMELSOHN (Cologne). The **genesis of congenital malformations,** especially of congenital microphthalmus. *C. f. M. W.*, Nos. 17 and 18, 1880. In his experiments on inoculation of tuberculosis, the author found in the fifth generation of a male rabbit with one eye two specimens of pronounced one-sided microphthalmus. Whether this condition has to be regarded as the consequence of tuberculosis of the iris, transmitted by both parents, or whether it was caused by the one-sided anophthalmus of the father, remains doubtful.

164. VINCENTIIS, CARLO DE (Palermo). Contribuzione allo studio della **lepra occulare.** *A. di Ott.*, vol. ix, 1, p. 51-74. Occurrence in both eyes of a twenty-year-old man after a contusion of the eye. The tumor started from the sclerotic, projected over the cornea, was attached to the conjunctiva, and was of a hard consistency. At the same time leprous infiltration of the mucous membrane of the mouth and pharynx, and pemphigus-like eruptions in different parts of the skin. The microscope showed the structure of leprous tissue as described by BULL and HANSEN (the leprous diseases of the eye, Christiania, 1873). In the other eye the tumor disappeared spontaneously.

V.—SPECIAL PATHOLOGY.

CONJUNCTIVA.

165. BENDA, C. Contributions to the statistics of blennorrhoic conjuncitvitis. Among 204 new-born, 47=23 per-cent., had corneal affections; among the other 145 only 24=16.5 per-cent. *Inaug. Dissert.*, Berlin, 1880.

166. HALTENHOFF. **Conjunctival hemorrhage** in a new-born child. Hæmophilia; uncontrollable hemorrhage caused **death** within 36 hours. *Rapp. sur les trav. dela Soc. Méd. de Genève, p. l'an* 1879. Genève, Libr. Georg., 1880.

167. REDARD, T. Sur un cas rare de **lymphadénome périoculaire** et de la conjonctive. Enucléation. Guérison. Without any other affections of the coats of the eye. *Rec. d'Ophth.*, 3, vol. ii, No. 4, April, 1880.

168. REICH. Conjunctival affection with formation of vesicles and extravasations after taking new wine, in five persons, with venous hyperæmia of the retina and optic nerve. Chemical examination of the wine without result. *Arzt.*, No. 6, 1880. *C. f. A.*, p. 279.

169. SAMELSON, A. Recurrent sarcoma of the eye. *Brit. Med. Jour.*, February 28th, p. 325.

170. SICHEL, Jr. **Syphiloma** in the scleral **conjunctiva** between inferior and internal recti muscles reaching to the corneal margin. Literature, 14 cases. *C. f. A.*, May, p. 145.

CORNEA.

171. ALEXANDER. Neuroparalytic keratitis. Two cases in syphilitic patients. *Deutsche Med. Wochenschr.*, No. 26.

172. FUCHS, E. **Dermoid of the cornea.** *Z. M.*, vol. xviii, p. 131. Characteristics: 1. It does not involve the cornea; 2. the epithelium is similar to that of the cornea; 3. hairs and sebaceous glands are absent, but there is a gland which resembles Krause's glands.

173. GAYET. Papillôme cornéen guéri par le poudre d' alun. *Rev. Méd.*, No. 4, p, 126.

174. HÖGYES, A. The **changes of the eye after extirpation of the facial nerve.** *Arch. f. exper. Pathol.*, vol. xi, p. 258. *C. f. Med. W.*, 1880. After simple division of the nerve, permanent affections of the cornea are rare; after evulsion the cornea becomes dry, with more or less extensive ulceration; after division of the trigeminus, the eye is always lost by the subsequent neuropathic keratitis.

175. KENDALL, JOSEPHINE (Boston). **Herpes corneæ.** *Inaug. Diss.*, Zurich, p. 32. Herpes febrilis or catarrhalis, and herpes zoster or neuroticus are distinguished; the former occurred in about 0.4 per-cent., the latter in 0.025 per-cent. Among 17 cases of herpes zoster, the cornea was inflamed in eleven.

176. KRETSCHMER. **Keratitis neuroparalytica.** Panophthalmitis after neurectomy of the infra-orbital nerve. *C. f. A.*, March, p. 65, with polemic correspondence, *l. c.*, p. 163, 236, 293, and 363.

177. NETTLESHIP. Pathology of congenital opacity of cornea. *The Lancet*, No. 7, 1880.

178. RENTON, CRAWFORD (Glasgow). Case of conical cornea, trephining, vision improved. *The Lancet*, No. 19.

IRIS, CILIARY BODY, CHOROID.

179. GALEZOWSKY. A case of congenital irideremia through several generations. *Rec. d' Oph.*, 3, No. 2, February.

180. NETTLESHIP. Cases of spontaneous panophthalmitis in children. *Med. Times and Gaz.*, No. 1542.

181. RIVA. The changes in the choroidal pigment-epithelium in insane persons. *C. f. Psych.*, 179. 1880. The choroid is, especially in the intermittent form of psychosis, frequently more or less deprived of pigment; and the retina is pale and opaque.

182. SCHLEICH. Primary melanotic endothelial sarcoma of the ciliary body. *Nagel's Mittheil. aus der Ophth. Klinik*, Tübingen, vol. 1, p. 143.

183. WOLFE (Glasgow). A case of bleeding tumor of the iris, about 4 *mm.* in diameter, bleeding every 4 to 6 weeks. *Med. Times and Gaz.*, May 8. p. 504.

SYMPATHETIC OPHTHALMIA.

184. CHISOLM, J. A piece of metal in the eye for 23 years, without causing sympathetic ophthalmia. *Boston Med. Journ.*, vol. cii, p. 248.

185. CHISOLM, J. Sympathetic ophthalmia, rapidly destroying sight, prompt relief by neurotomy of the optic and ciliary nerves of the lost eye. *New York Med. Journ.*, vol. xxxi, No. 3, March, 1880.

186. CUIGNET. Sympathies oculaires. *Rec. d'' Ophth.*, 3 S., No. 1, Jan., 1880. The author distinguishes four forms of sympathetic ophthalmia, drawing the lines rather wide.

187. LANDESBERG (Philadelphia). On the occurrence of sympathetic ophthalmia, consequent to linear extraction of cataract. *Med. and Surg. Rep.*, vol. xlii, 18, p. 375.

188. KRÜCKOW. Two cases of sympathetic ophthalmia, opacities of the anterior lens capsule, and changes in the uveal tract. *C. f. A.*, March, p. 67.

189. MOOREN AND RUMPH. Vascular reflexes in the eye. Experimental researches on the genesis of sympathetic ophthalmia. *C. f. d. Med. Wissensch.*, No. 19. Comp. No. 14, of this Report.

190. NETTLESHIP. **Symphth. ophth. after excision of the eyeball.** *Brit. Med. Journ.*, April 17, 1880. Comp. *Med. Times and Gaz.*, No. 1,555. *The Lancet*, No. 16.

Three cases: 1.—22 days after the enucleation, 32 days after a cataract operation in a phthisical patient (!) under the picture of neuro-retinitis and irido-cyclitis. 2.—23 days after the enucleation, 42 days after the injury (rupture of the sclerotic) appearing as iritis with detachment of the retina. 3.—25 days after enucleation, 50 days after the lesion, as iritis. The latter two cases gave a relatively good result; 6 cases are mentioned from literature.

191. SCHNEIDER, J. **Sympathetic inflammations of the eye after cataract operations.** Among 758 cases of sympathetic affections, operative interference is mentioned 69 times as the cause, 33 times after cataract extraction, 22 times after reclination, 3 times after discission, twice after dilaceration, 4 times after iridectomy, 3 times after iridencleisis, once after drainage, once after tattooing. *Inaug. Dissert.*, Würzburg, 1880.

GLAUCOMA.

192. SCNABEL. **Secondary glaucoma.** Upon an observation of glaucoma after traumatic luxation of the lens and stretching of the fibres of the zonula in incarceration of the capsule into the wound, the author is opposed to Knies' view of an occlusion of Fontana's spaces. The abnormal stretching of the zonula is said to be the only cause of glaucoma, especially since the author observed the cure of an acute attack in chronic glaucoma by the spontaneous luxation of the lens, with detachment, and thus relaxation of the zonula. *Wien. Med. Bl.*, vol. iii, Nos. 6 and 7, pp. 130–132, 155–156.

RETINA AND FUNCTIONAL DISTURBANCES.

193. ANGELUCCI. Thrombosis of the central retinal vein in insufficiency of

the aortic and mitral valves, and hypertrophy of both ventricles. Symptoms: marked venous pulsation, cherry-red spot at the macula, opacity of the surrounding retina, leading to retinal hemorrhages and atrophy of the optic nerve. *Z. M.*, vol. xviii, p. 21.

194. BAMBERGER and LÜTKEMÜLLER. A case of **caries of the sphenoid bone, and amaurosis.** *Wien. Med. Bl.*, vol. iii, 1, 2, 3, p. 1–3, 38–39, 58–59. Tubercular process, with caries of the basis cranii, and implication of the chiasm, trigon. olfact. on both sides, tuber cinereum, and the tractus optici. The amaurosis was caused by atrophy of both optic nerves without preceding neuro-retinitis.

195. BECKER, O. **The spontaneous pulsation of the retinal arteries in Basedow's disease.** *Z. M.*, vol. xviii, 1. In 7 cases it was observed 6 times, and is ascribed to paralysis of the vascular nerves.

196. BREMER, VICTOR. Am. det pathol. fund hos Dôvstumme. Among 223 **deaf-mutes,** HANSEN and KRENCHEL found 9 cases — 4 per cent. of **retinitis pigmentosa.** *Inaug.-Dissert.*, Kopenhagen, 1880.

197. CURSCHMANN. A case of **total left-sided hemianopsia,** with softening in the right occipital lobe. *Berl. Klin. Wochensch.*, No. 22.

198. DESPAGNET, F. A case of **periodic amaurosis** analogous to epileptiform seizures, in a patient with nervous affection. *Rec. d' Ophth.*, vol. iii, 1, Jan., 1880.

199. GATLI, FR. **Amaurosis produced by salicylate of soda poisoning.** *Gaz. degli Ospit.*, vol. i, 4, p. 129.

200. KRENCHEL. **A peculiar case of amblyopia,** where, by yellow fever, S. had been temporarily much impaired; but with now normal sense of forms and color. A diminution of sight for medium intensities of illumination could be stated. *Z. M.*, vol. xviii, p. 47; comp. *Ugeskr. f. Læger.*, Dec. 6, 1879.

201. LANG (HIRSCHBERG'S practice). **Amblyopia in females.** Extra-ocular atrophy of both optic nerves, without distinct ophthalmoscopic signs of neuro-retinitis, 27 times; neurotic atrophy 31 times. Pure amblyopia is very rare. No case of amblyopia with central scotoma and preserved periphery of the visual field and normal limits for perception of colors reported. Four cases of hysterical amblyopia, in two of which the one-sided amblyopia could be demonstrated to be only apparent. *Inaug.-Dissert.*, Berlin.

202. LOPEZ BARALT. Contrib. à l'étude du **scotome scintillant** ou amaurose partielle temporaire. *Thèse de Paris*, 1880.

203. MORANO, FRANC. **Amblyopia amaurotica per tenia.** *Giorn. delle Mal. degli occhi*, vol. iii, Genuario, 1880.

204. RAVA (Sassari). Intorno il **distacco della retina.** In the greater number of cases detachment of the retina is caused by disturbance of intra-ocular circulation, especially in the choroid, as a passive congestion, by a greater dilatability of the atrophic, thinned walls of the blood-vessels. The dialysis of the vitreous is only a consequence of this disturbance of circulation, and is always developed after the detachment has occurred. Fluidity of the vitreous in myopic eyes might, besides, be caused by a filtration of lymph from the perichoroidal and subvaginal spaces, through the rarefied substance of the choroid, lamina elastica, and pigment epithelium in the extent of the staphyloma. *Annal. di Ottal.*, vol. ix, 1, p. 24.

OPTIC NERVE.

205. GALEZOWSKY. A case of **congenital coloboma of the optic nerve** in both eyes, without diminution of sight. *Rec. d' Ophth.*, 3, No. 1, Jan., 1880.

206. NETTLESHIP, E. Cases of **temporary affection of one optic nerve, comparable to Bell's paralysis of the facial.** *The Lancet*, No. 20. The visual disturbance sets in rapidly, affects only one eye, is accompanied by slight inflammatory appearances at the optic discs, and ends in complete recovery. There is often, at the same time, neuralgia, rheumatic headache, less frequently facial paralysis. In one case the latter had preceded the ocular affection. The author has a number of observations, which have been described by LEBER as retrobulbar inflammations, and which, in ordinary practice, are of rare occurrence.

207. UHTHOFF. **Atrophy of the optic nerve,** with special consideration of 1, the causes; 2, the knee-phenomenon; 3, the conditions of the visual field. It comprises 83 cases. The knee-phenomenon is absent in 13 out of 15 cases of spinal atrophy of the optic nerve, in one-third of the cases of genuine progressive atrophy, and is, therefore, a valuable symptom for the differential diagnosis. In 7 patients there was, at the same time, myosis. In spinal and simple optic nerve atrophy the limitation of the visual field begins in a small majority of cases at the outer side. *A. f. O.*, vol. xxvi, 1, p. 244.

LENS.

208. DEUTSCHMANN. The changes of the lens in purulent processes of the globe. With illustr. *A. f. O.*, vol. xxvi, 1, p. 135.

209. FUCHS, E. **Complete sequestration of the cornea after an ordinary linear extraction.** In a diabetic patient the whole cornea became necrosed; the inner layers showed microscopically a dense infiltration with micrococci. In addition, a case of complete sequestration of the globe, within Tenon's capsule after an iridectomy for glaucoma, is mentioned. *Z. M.*, vol. xviii, p. 134.

210. HEUSE. Two cases of **one-sided zonular cataract in affections of the bones** on the same side of the body; this tends to support BECKER's view of the causal connection between zonular cataract and rachitis. In one case the head of the femur was atrophic, with congenital luxation of the hip-joint; in the other case there was a defect in the nasal portion of the right maxilla. *C. f. A.*, June, p. 177.

211. JUST. Cases of nuclear cataract in children. Seven cases in four children, all removed by linear extraction. In one the attempt at discission showed the symptom of hard consistency, mentioned by GRAEFE.

212. LEBER. **Opacity of the lens resembling nuclear cataract after a lesion of the capsule,** with remarks on the origin of stationary nuclear and zonular cataract. Leber confirms HORNER's theory of the formation of zonular cataract, by an observation of new-formation of transparent lens substance around a shrunken opaque nucleus. *A. f. O.*, vol. xxvi, 1, p. 283.

ACCOMMODATION AND REFRACTION.

213. MANDELSTAMM (Riga). A case of **monocular diplopia and binocular tetraopia,** in a ten-year-old boy, without any objective changes. A short

time previously he had sustained a severe fracture of the skull. The author explains it by an accommodative disturbance which had necessarily caused abnormal astigmatism of the lens. *C. f. A.*, p. 180.

214. MENGIN observed the disappearance of marked asthenopic symptoms after the extraction of a carious tooth. *Rec. d' Ophth.*, vol. iii, 1, Jan., 1880.

215. ZEHENDER. **The influence of school-life in producing myopia.** In the sixth class there were 10.9 per cent. of myopes ; in the fifth, 16 per cent.; in the fourth, 33.24 per cent. ; in the third, 36.66 per cent. ; in the second, 47.8 resp. 33.33 per cent.; in the first class, 41.38 per cent. *Lecture* and *Reprint from the Rostock Gaz.*, Feb. 29, 1880, and Enke, Stuttgart.

MUSCLES.

216. CHEVALLEREAU. Recherches sur les paralysies oculaires consécutives à des traumatismes cérébraux. *Thèse de Paris*, 1880.

217. EULENBURG. A severe case of **prosopospasmus.** Intense **blepharospasm** for years. Tic convulsif. Neurotomy of the supra-orbital nerve without result. Stretching of the facial nerve removed the spasm but led to total paralysis of all its facial branches. *C. f. Psych.*, No. 7, 1880.

218. SAMELSOHN (Cologne). A **new case of intermittent concomitant convergent squint** in a girl six years old, who squinted every other day in the regular tertiary type. After two years and a quarter the squint had become periodic with constant predominance of the internal rectus. *C. f. A.*, April p. 117.

219. ULRICH, R. The **etiology of convergent squint.** The conclusions are based upon the views of impediments to squinting in hyperopes previously advanced (*Z. M.*, vol. xvi, 1878), and proved as correct by experiments and clinical observations. The impediments are, in the first place, to be found in the external ocular muscles, the negative part of the hypermetropia being accompanied by a corresponding negative part of adduction (relative weakness of adduction), or even by an absolute weakness of the internal recti muscles (absolute weakness of adduction) ; in the second place, the impediments are found in peculiarities of the visual act, the phenomenon of contention for ascendance of the images of the yellow spots in the fixing and the squinting eye producing such a disturbance of vision, that this contention can be regarded as an effective preventive to squinting. *Z. M.*, vol. xviii, p. 156.

LIDS.

220. ADAMÜCK. **Amyloid degeneration** of the eye. He reports eight cases, in all of which the conjunctivæ had trachomatous affections. *Prot.* No. 3, *Med. Ges. at Kasan*, 1880.

221. DEMONS. **Kyste huileux du sourcil.** *Soc. de Chir. à Paris*, Jan. 21, 1880.

222. PARINAUD. Des suppurations de la paupière inférieure et de la région du sac lacrymal d' origine dentaire. *Arch. Génér. de Med.*, Jan., 1880.

223. SAMELSON (Manchester). **Recurrent sarcoma of the sclerotic and lids,** of traumatic origin, starting from the scleral conjunctiva. Two years later, recurrence in the lower lid. Final result unknown. *Brit. Med. Journ.*, vol. ii, p. 28, 1880.

224. SCHLEICH. **Congenital coloboma of the lids** in a patient 27 years old; in one eye the fissure was only in the tarsus. *Nagel's Mitth. aus d. ophth. Klinik zu Tübingen*, vol. i, p. 114, Laupp.

LACHRYMAL APPARATUS.

225. HAFFNER. Rare **migration of a round worm,** 3 *cm.* in length, into the **left lower lachrymal canal** in a child suffering from severe whooping-cough. *Berl. Klin. Wochensch.*, No. 24.

ORBIT.

226. V. BERGMANN (Würzburg). **Indirect gun-shot fractures of the base of the skull,** resp. the **roof of the orbit,** were found in six cases, where the ball had not struck the orbital plates, and in all of which the roof of the orbit was broken. *C. f. Chir.*, 1880, No. 8.

227. SAMELSOHN (Cologne). Demonstration of a **cavernous tumor of the orbit,** which had been removed with perfect preservation of the globe. (Niederrh. Ges. f. Nat.-Heilk.) *Berl. Klin. Wochenschr.*, No. 1, 1880.

INJURIES.

228. MACNAMARA. Injury of the eye in the ciliary region; preservation of sight. *The Lancet*, vol. i, Apr. 14, 1880.

229. NETTLESHIP. On some effects of blows upon the eyeball. *The Lancet*, vol. i, p. 25.

230. SAMELSOHN. **Traumatic aniridia and aphakia** with preservation of sight, the result of a blow with the horn of a cow. It is stated that during accommodation a distinct advancement of the head of the ciliary muscle could be observed. *C. f. A.*, p. 184.

231. SIGISMUND. A small splinter of wood kept in the eye for 47 years without any disturbance. *Berl. Klin. Wochenschr.*, No. 5, 1880.

OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

232. BOUCHUT. Des **localisations cérébrales.** 1. Tuberculous destruction of the optic tracts, amaurosis, neuro-retinitis, paralysis agitans. 2. Abscess of the frontal lobe without any symptom of paralysis or delirium. 3. Tuberculosis of the optic tract without any symptoms. *Gaz. des Hôp.*, 149, 1879.

233. ERB. The **ocular affections in tabes dorsalis.** Among 56 cases there was seven times atrophy of the optic nerve, and seventeen times paralysis of ocular muscles. *Deutsch. Arch. f. Klin. Med.*, 1879.

234. FIALKOWSKY. **Affection of the eye in scurvy.** *Arzt*, No. 20, 1880. *C. f. A.*, p. 279. 35 per cent of the cases of scurvy were complicated with ocular affections.

235. GALEZOWSKY. De l' **influence des grands froids sur les affections oculaires,** viz.: corneal ulcers, paresis of the outer and inner ocular muscles, and a case of double exophthalmus caused by caries of the orbit. *Rec. d'Ophth.*, 3, No. 2, Febr.

236. HIRSCHBERG. A case of **metastatic ophthalmia** in a patient with

tabes who had **suppurative cystitis.** Probably embolism in the brain and in the interior of the eye. *C. f. A.*, p. 188.

237. HOSCH (Basel). **Embolic panophthalmitis in puerperal fever.** Literature of fifteen cases. H. found in one case large accumulations of micrococci in some of the smaller retinal vessels, also in numerous uriniferous tubes, and in more developed stages in the vitreous body. *A. f. O.*, vol. xxvi, 1, p. 177.

238. JACOB. Cases of **nervous disease with ophthalmoscopic phenomena.** 1, cerebral tumor, optic neuritis; 2, cerebellar tumor, optic neuritis; 3, cerebral softening, hemiplegia, optic neuritis; 4, cranial tumor, optic neuritis. *The Lancet*, 5, 6, 9, 10, 12, 13.

239. JACSON, HUGHLINGS. Cases illustrating the value of the ophthalmoscope in the investigation and treatment of diseases of the brain. *The Lancet*, No. 24.

240. KAHLER. Septic affections of the retina. One case of chronic septicæmia after periostitis. In one case fungous infection could be demonstrated with certainty. *Prog. Med. Wochenschr.*, No. 19. *Vereins-Chronik.*, p. 188.

241. PECHDO. **Paralyse de l' accommodation** consécutive à la **fièvre typhoide.** Duration of several months. *Rec. d' Ophth.*, 3, S., No. 2, Febr.

242. POWER, H. The diseases of the eye occurring in connection with pregnancy. *The Lancet*, 19, 20, 22.

243. ROBIN. Les **troubles oculaires dans les maladies de l' encephale.** *Paris, Baillière et fils*, 1880, 600 pages. In this elaborate treatise, which is based upon an extensive knowledge of the literature and a large clinical experience, the close anatomical, physiological, and pathological connection between the brain and eye is dwelt upon; the cerebral disturbances of motility of the external and internal ocular muscles, and on 215 pages the different forms of sensorial affections are described. The author further enters upon the disturbances of circulation in both eyes, the congenital affections of the eye, as far as they are in connection with cerebral troubles; gives, moreover, a detailed account of corresponding observations in veterinary ophthalmology, and concludes with a careful résumé of the whole in regard to the value of the ocular affections for the diagnosis and prognosis of cerebral diseases.

244. STEWART, GRAINGER. The **eye symptoms in locomotor ataxia.** Among 70 cases there were 20 cases of squint, three of ptosis, four of diplopia without manifest squint, seven of myosis, four of difference in the pupillary diameter, eight of immobility to light, whilst the pupils contracted upon convergence, four times temporary amblyopia with subsequent improvement, fourteen times atrophy of the optic nerves with amaurosis, in one half of the cases at quite an early period. *C. f. Med. W.*, 1880, p. 62.

245. UHTHOFF. Cases of **ocular affections from infectious diseases** (from Prof. SCHÖLER'S clinic). *Deutsche Med. Wochenschr.*, No. 23.

246. WERNICKE. A case of **brain tumor** with symptoms of paralysis of the right abducens and paralysis of the left internal rectus. Double choked disc, S—1. Later, paresis of the left abducens and the right internus. (Paresis of the associated lateral movements.) Cure by iodide of potassium 6.0 pro dosi. Diagnosis: Gummous tumor of the pons. *Deutsche Med. Wochenschr.*, Nos. 8, 9.

Fig. 1.

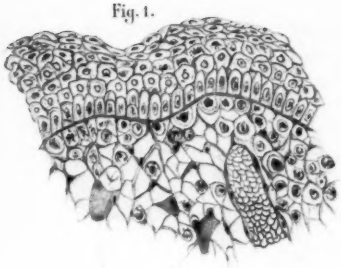


Fig. 2.

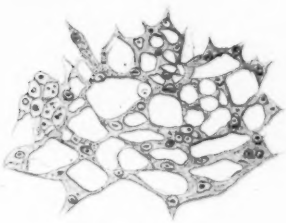
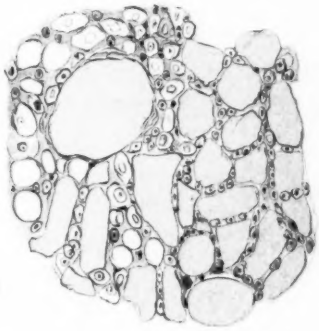


Fig. 4.



a

Fig. 3.

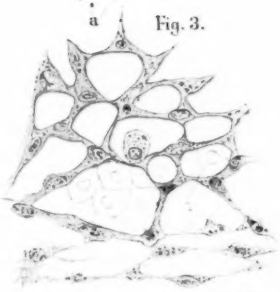


Fig. 5.

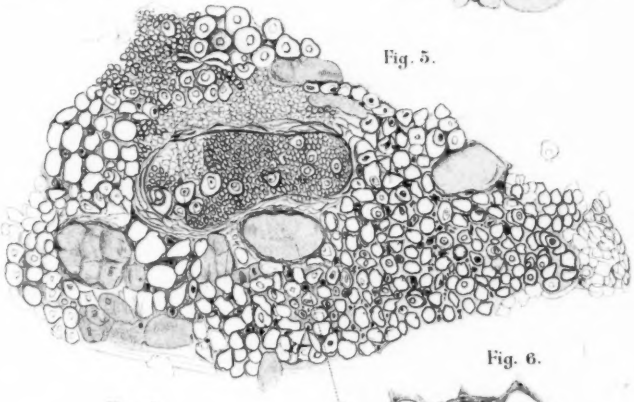


Fig. 6.

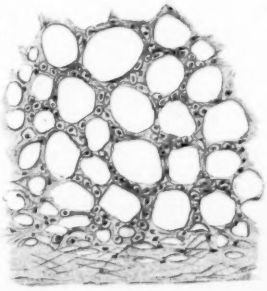
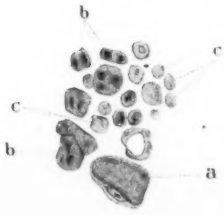
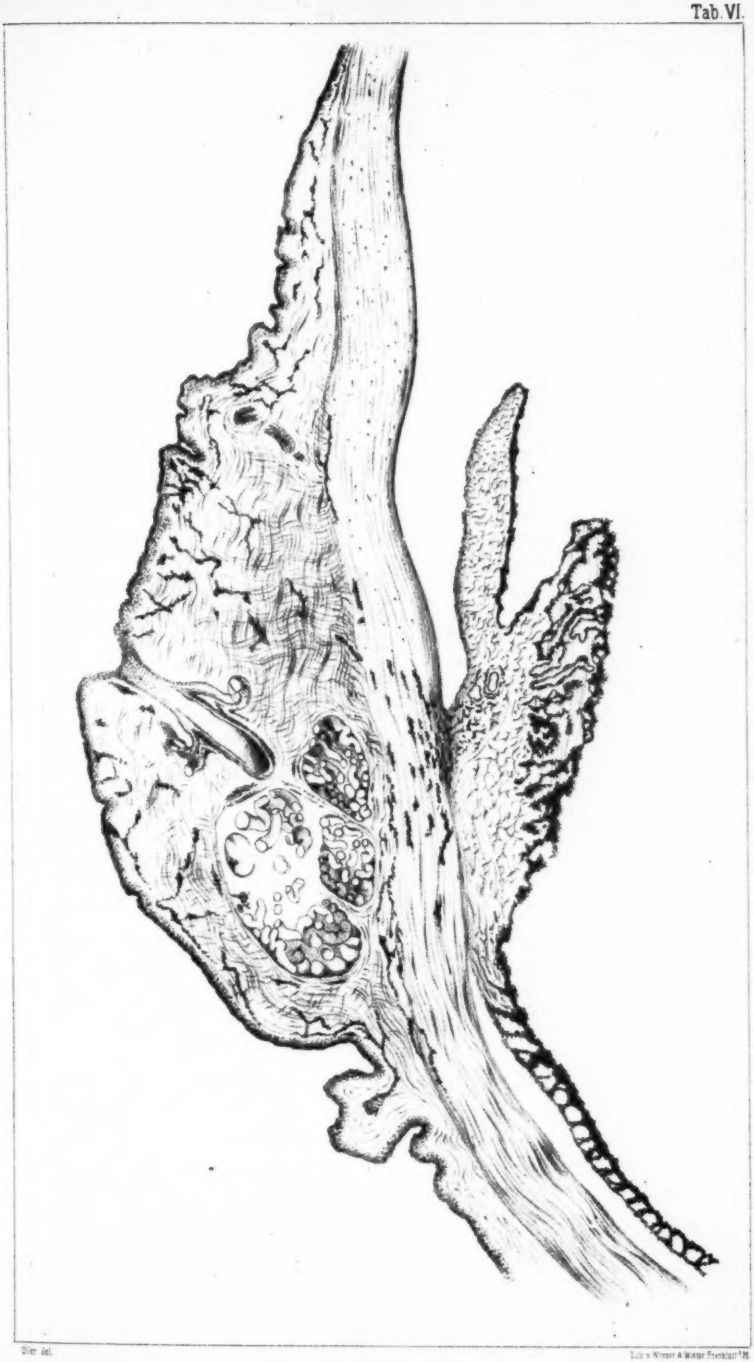


Fig. 7.





Dier del.